An Analysis of Publications on Particle Swarm Optimisation Applications

Riccardo Poli

Department of Computer Science

University of Essex, UK

`rpoli@essex.ac.uk`

Department of Computer Science

University of Essex

Technical Report CSM-469

ISSN: 1744-8050

May 2007

Abstract

Particle swarm optimisation (PSO) has been enormously successful. Within little more than a decade hundreds of papers have reported successful applications of PSO. In fact, there are so many of them, that it is difficult for PSO practitioners and researchers to have a clear up-to-date vision of what has been done in the area of PSO applications. This brief paper attempts to fill this gap, by categorising a large number of publications dealing with PSO applications stored in the IEEE Xplore database at the time of writing.

1 Introduction

Particle swarm optimisation can be and has been used across a wide range of applications. In general we can say that areas where PSO has shown particular promise include multimodal problems and problems for which there is no specialised method available or all specialised methods give unsatisfactory results. However, it is hard to be much more specific that that. PSO applications are so numerous and diverse that a whole book would be necessary just to review the most paradigmatic ones, assuming someone could identify them among the many hundreds of applications reported in the literature: a really enormous task.

Here we have a much more modest objective: to identify the main classes of applications where PSO has been successfully deployed. We have based our categorisation on a analysis of titles and abstracts of the over 1,100 publications on particle swarm optimisation stored, at the time of writing, in the IEEE Xplore database. Of these publications, around 350 are proposals for improvements and specialisations of PSO. Around 700 papers (55 of which are journal papers) can be classified as applications of PSO, although many of them involve also the customisation or extension of the method to best suit the specific application of interest.[1]

Although the analysis has been largely manual, because of the large size of this database, to speed up the work we have made use of several small computer programs which helped us in the identification of the main categories of applications and gave us a first rough classification of papers. Categories and class assignments were then checked and adjusted manually one-by-one. We describe the process in more detail in Section 2.

As a result of this effort we divide PSO applications into 26 different categories. Categories and related applications are listed in alphabetical order in the subsections of Section 3. For each

---

[1]The remaining entries in the database are conference proceedings books and other miscellaneous entries.

class of applications we indicate what fraction of all the application papers in the IEEE Xplore is devoted to that class. However, one should bear in mind that many (if not most) papers span more than one category. For examples, many classifiers are hybrids of PSO and neural networks, many applications involve some form of design, and so on.

We provide some conclusions in Section 4.

2 Category Selection and Classification

Dividing PSO applications into areas is difficult. So, as we mentioned in the previous section, we partially mechanised the process. This was done through a number of programs in the Octave/Matlab language, Xemacs macros and Unix utilities.

We started our analysis by searching the IEEE Xplore database for any papers matching the search phrase "Particle Swarm Optimization". This produced around 1,100 hits. Not all of these represented PSO applications (e.g., many were proposals for improvements and specialisations of PSO). However, we did not try to directly identify application papers. Instead, we mechanically extracted all terms used in titles and abstracts. After manually excluding determiners, adjectives, etc., this produced well over 4,000 unique terms. These were then manually checked for relevance from the point of view of applications. 928 key terms remained after this filtering process.

We then used the key terms to define a similarity relationship between papers and used papers to define a similarity relationship between key terms, as follows. Each paper was assigned a vector with 928 components (as many as our key terms). Each component represented how many times the corresponding key term appeared in title and abstract of the paper. Given any two papers, we took the scalar product between the corresponding vectors as the similarity between the two papers. Similarly, each key term was assigned a vector with 1,100 components (as many as the PSO papers in IEEE Xplore). Each component represented how many times the key term appeared in title and abstract of the corresponding paper. We then defined the similarity between key terms as the scalar product between the corresponding vectors.

These two similarities relationships induce corresponding graph structures on the paper and key term "spaces", where each paper/term corresponds to a node and nodes are connected by edges wherever similarity between corresponding papers/terms is above some prefixed threshold (e.g., zero). The edges are weighted by similarity. We can then make use of graph drawing packages to obtain pictorial representations of PSO application papers, PSO application areas and their relationships.

For this purpose we used the open-source graph drawing program `neato` (http://www.graphviz.org/). In this program the weights of the edges in a graph are interpreted as attractive forces between nodes. Starting from a random placement, the program iteratively adjusts the position of the nodes in an attempt to minimise the energy in the system. Attractive forces are balanced by a basic repulsive force between nodes to prevent the graph from collapsing to a single point. Figures 1 and 2 show two examples of the types of graphs one obtains.

By zooming on areas where a high density of links are present, one can obtain semi-quantitative evidence of which are the important application areas in PSO. See, for example, Figure 3 where we show a zoomed version of Figure 1. One can clearly see there that some terms, such as design, control, power and antenna, act as "hubs" in PSO applications.

After performing this information gathering exercise, we proceeded to do a more formal analysis. The key terms were scored on the basis of how many papers in the database used such terms in title and abstract. This further helped identify important application categories. Indeed, the most frequent terms were "network", "control", "model", "design", "power", "neural", "plan", "fuzzy", "class", "cluster", "antenna", "image", "planning" and "scheduling", but many others were identified as important. Based on this analysis, we created provisional categories (the headings of the subsections in Section 3).

All PSO papers in the IEEE Xplore database were then mechanically provisionally assigned to one of the most frequent keywords. Then we manually analysed each publication and either
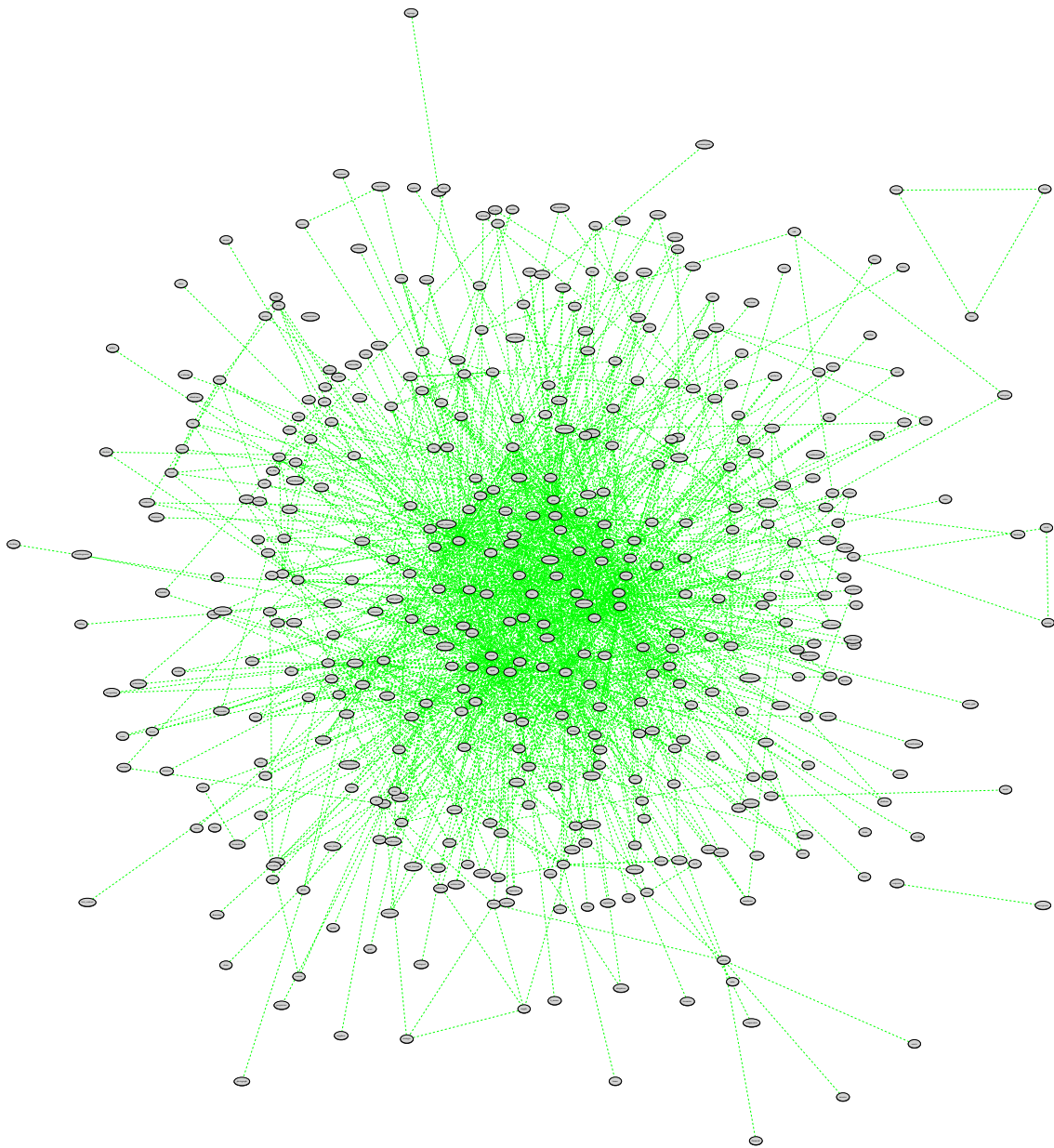
2

Figure 1: Example of graph representation of the key terms relevant to PSO applications and their relationships. The rest-length for repulsive forces between nodes was set to 9. Only links (similarities) with strength greater than 5 were passed to `neato`.
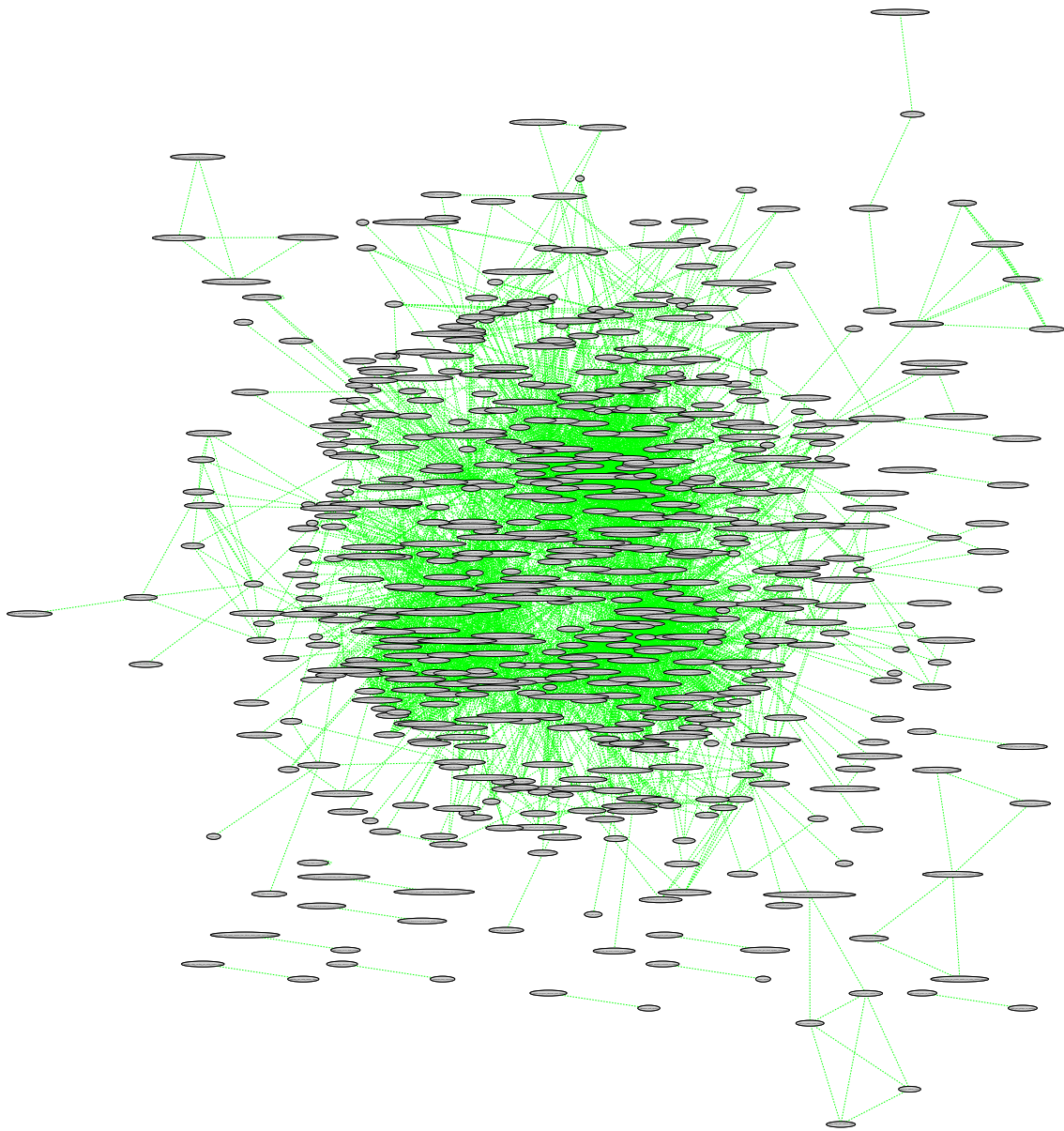
Figure 2: Example of graph representation of PSO application papers and their relationships. Papers are labelled with the list of key terms appearing in their title and abstract. The rest-length for repulsive forces between nodes was set to 9. Only links (similarities) with strength greater than 9 were passed to `neato`.
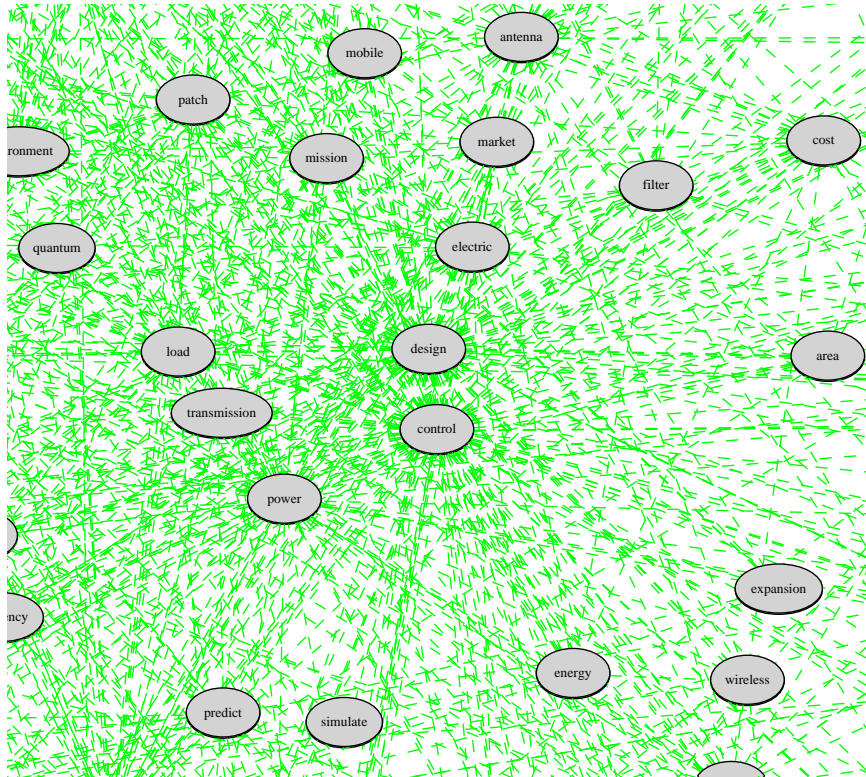
Figure 3: Zoomed version of Figure 1.

confirmed the mechanical classification, moved the paper to a different category, deleted the paper if it was not an application paper, or, occasionally, created a new category for that paper.

The result of this process is reported in the next section.

3 PSO Applications

3.1 Antennas

The area of antenna design is extremely popular with approximately 6 % of all application papers in the IEEE Xplore database covering this area. Applications include (see [234]): the optimal control [109, 30, 42, 336, 136] and design [168, 257, 49, 48] of phased arrays, broadband antenna design [259, 231] and modelling [260], design of Yagi-Uda arrays [40, 39, 609, 364], array failure correction [597], optimisation of profiled corrugated horn antennas [440], optimisation of a reflec-tarray antenna [172], far-field radiation pattern reconstruction [418, 559], antenna modelling [560], design of planar antennas [350, 275], conformal antenna array design [148, 50], design of patch antennas [233], antenna miniaturisation [28, 41], design of multi-band antennas [369, 32], design of aperiodic antenna arrays [235], near-field antenna measurements [421], synthesis of antenna arrays [71, 607], reflector antennas [169], adaptive array antennas [264], design of implantable antennas [428].

3.2 Biomedical

Biological, medical and pharmaceutical applications are also very popular with approximately 4% of all application papers in the IEEE Xplore database covering these areas. Applications include: human tremor analysis for the diagnosis of Parkinson's disease [126], inference of gene regulatory networks [576, 443, 434, 577, 326], human movement biomechanics optimisation [255], phylogenetic

tree reconstruction [334], cancer classification [574, 442, 449, 335] and survival prediction [575], DNA motif detection [187], gene clustering [566], identification of transcription factor binding sites in DNA [64], biomarker selection [435], protein structure prediction [112] and docking [306], drug design [401, 546, 60, 59], radiotherapy planning [292], analysis of brain magnetoencephalography data [568], RNA secondary structure determination [378, 378], electroencephalogram analysis [427], biometrics [508].

3.3   Communication Networks

The design and optimisation of communication networks is the subject of around 30 papers (4%) in the applications database. Applications include: bluetooth networks [373, 208], auto-tuning for universal mobile telecommunication system networks [124], optimal equipment placement in mobile communication [595, 379], routing [223, 489, 56, 528, 529, 527], radar networks [520], wavelength-division-multiplexed network [295], peer-to-peer networks [229], TCP network control [358], bandwidth and channel allocation [135, 634, 656, 589], WDM telecommunication networks [492, 76, 628], wireless networks [272, 374, 85], grouped-and-delayed broadcasting [533], bandwidth reservation [209].

3.4   Clustering and Classification

Clustering, classification and data mining are the topics of approximately 30 papers (4 %) in the bibliography. Applications include: clustering [69, 178, 89, 506, 453], clustering in large spatial databases [590, 321], dynamic clustering [301, 617], dimensionality reduction [128, 97], genetic-programming-based classification [591, 397], fuzzy clustering [536, 444, 621], cascading classifiers [395], classification threshold optimisation [396], classification of hierarchical biological data [193], electrical wafer sort classification [365], document and information clustering [95, 526], data mining [469, 371, 167], feature selection [22, 460, 150, 486].

3.5   Combinatorial optimisation

Around 20 papers (2 %) in the database deal with combinatorial optimisation problems. These include applications on: floorplanning [480, 201], travelling-sales man problems [655, 407, 408, 328, 454, 530, 524], packing and knapsack [579, 307, 457, 457], minimum spanning trees [170], satisfiability [2], path optimisation [659], knights cover problem [155], n-queens problem [204], layout optimisation [385], vehicle routing [555, 44, 661], urban planning [12], FPGA placement and routing [180].

3.6   Control

Control applications have one of the largest shares (7%) of application papers in the IEEE Xplore database. Application areas include: automatic generation control tuning [1], design of controllers [45], traffic flow control [331], adaptive inverse control [545], predictive control [563, 564], PI and PID controllers [542, 238, 202, 551, 160, 245, 200, 184, 425, 504, 398, 103, 324, 611, 10, 70, 586], strip flatness control [573], ultrasonic motor control [194], power plants and systems control [189, 250, 602, 280, 87, 14, 52, 156, 510, 251, 34, 243, 392], control of chaotic systems [162, 300], process control [498, 91], adaptive PMD compensation in WDM networks [629], fractional order controllers [600], combustion control [262], inertia system control [355], automatic landing control [244].

3.7   Design

Around 5% of the bibliography is devoted to design applications. These include: conceptual design [322], induction heating cooker design [196], VLSI design [416, 125], RF circuit synthesis [411, 18], worst case electronic design [472, 473], filter design [37, 541, 36, 214], antenna design [319, 31, 29, 232], CMOS wideband amplifier design [412], motor design [35, 554], logic circuits

design [332, 88, 375], power systems [6], transmission lines [256], mechanical design [117, 317, 288], electromagnetics [94, 116], case library search [660].

3.8 Distribution networks

Design and restructuring of electricity networks and load dispatching are among the problems most frequently attacked with PSO, occupying around 7 % of the applications bibliography. Applications include: transmission network planning [431, 447, 237, 386, 627], network reconfiguration and expansion [592, 522, 236, 249, 466, 273, 253, 452], distributed generation [383, 514], micro-grids [610], economic dispatch problem [494, 276, 158, 513, 132, 538, 640, 639, 67, 199, 532, 230, 21, 20, 159, 539, 587, 414, 405, 493, 463, 448, 413, 271, 8, 415, 281, 359], voltage regulation [394, 100], congestion management [581, 356].

3.9 Electronics and Electromagnetics

A substantial proportion of the papers in the IEEE database describe applications in the areas of electronics and electromagnetics. Here we list further applications representing approximately 6% of the database. These include: on-chip inductors [346, 347, 348, 43], fuel cells [432], FPGA-based temperature control [240], AC transmission system control [329], electromagnetic shape design [38, 9], microwave filters [344, 353], generic electromagnetics design and optimisation applications [173, 174, 176, 175, 192, 354, 439, 368], linear array antenna synthesis [367], RF IC design and optimisation [17, 82], semiconductor optimisation [534, 569], high-speed CMOS [459], conductors [166, 540], frequency selective surface and absorber design [164, 93, 165], CMOS RF wideband amplifier design [410], voltage flicker measurement [15], circuit synthesis [430], shielding [352], configuration of FPGAs and parallel processor arrays [490, 491, 219, 512], digital circuit design [179].

3.10 Engines and Motors

Around 10 papers (1.5%) in the applications bibliography deal with the design or optimisation of engines and electrical motors. Topics include: engine data classification [54], locomotive torque control [341], motor control in electric and hybrid vehicles [137, 547], induction motor speed control [183], direct motor torque control [55], fault and parameter estimation in induction motors [138, 419], optimisation of internal combustion engines [429], optimisation of nuclear electric propulsion systems [118].

3.11 Entertainment

Music generation and games have also a small niche in PSO applications, occupying approximately (1.3%) in the applications publication database. In the area of games, applications include: analysis of leaf nodes in game trees [363], learning to play board games [92, 153, 4, 3], iterated prisoner dilemma [154], learning to play solo Pong [277]. In the area of music, swarms have been used for interactive music improvisation [47, 46].

3.12 Faults

The detection or diagnosis of faults and the recovery from them occupies approximately (2.4%) of the application papers in the bibliography. Topics include: fault diagnosis of steam-turbine generators [562], circuits that automatically recover from component failure [191], gearbox fault diagnosis [195], automatic defect classification in semiconductor wafers [366], service restoration in power distribution [548, 604], fault-tolerant power systems [424], missing sensors restoration [129], fault diagnosis in digital circuits [198], test pattern generation for circuits [197], software fault detection [458], defensive islanding of power system [320], power transformers fault diagnosis [282], optimisation of repairable systems [16], diagnosis of faults in motors [314, 138].

3.13 Financial

Around 1% of the papers in the bibliography have to do with finance and economics. Topics include: financial risk early warning [608], investment decision-making [380], option pricing [107], investment portfolio selection [73, 571], electricity market [130, 567].

3.14 Fuzzy and Neuro-fuzzy

Around 26 papers (4% of the bibliography) attack problems in the area of fuzzy and neuro-fuzzy systems and control. These include: design of neuro-fuzzy networks [296, 357, 171, 242], fuzzy rule extraction [338, 654, 339, 650, 340], fuzzy control [297, 441, 330, 635, 185, 27, 467, 146], membership functions optimisation [139, 140], fuzzy modelling [351, 258, 114], fuzzy classification [215, 325], design of hierarchical fuzzy systems [80], fuzzy queue management [391].

3.15 Graphics and Visualisation

Applications in the areas of computer graphics and visualisation also have a share of the applications bibliography (2%). Specific topics include: graphic presentation of networks [315], dimensionality reduction [127], collision detection in graphic models [496, 599, 543, 544], texture synthesis [631, 632, 362], interactive particle swarms [343], 3D graphics [283, 518].

3.16 Image and Video

A large proportion of the applications bibliography (9%) of PSO applications is devoted to image and video analysis applications. Image analysis applications include: iris recognition [68, 81], fruit quality grading [224], face detection and recognition [474, 451, 79, 450], image segmentation [598, 98, 531, 287, 623], synthetic aperture radar imaging [51, 578], locating treatment planning landmarks in orthodontic x-ray images [86], image classification [61], inversion of ocean colour reflectance measurements [465, 553], image fusion [388], traffic stop-sign detection [618], defect detection [500], image retrieval [248, 65], human detection in infrared imagery [400], image registration [519, 484, 485], pixel classification [99], detection of objects [399], pedestrian detection and tracking [445], texture synthesis [630], microwave imaging [212, 213, 152, 110, 211], scene matching [464], photo time-stamp recognition [157], contrast enhancement [274, 390], 3D recovery with structured beam matrix [479], auto cropping for digital photographs [622], character recognition [293], shape matching [121], image noise cancellation [77]. Video applications include: MPEG optimisation [25], motion estimation [120], object tracking [24], body posture tracking [438, 218], traffic incident detection [470].

3.17 Metallurgy

About 9 papers (1.4% of the bibliography) deal with applications in metallurgy. These include: optimisation of steelmaking process [557, 582, 584, 226, 585, 227, 583, 653] and modelling in sintering process [525].

3.18 Modelling

Many papers in the bibliography involve some form of modelling. Several that have not been described under other headings are listed here. These form about 3% of the bibliography. Topics include: inversion of underwater acoustic models [495], modeling MIDI music [247], customer satisfaction models [312], thermal process system identification [111], friction models [384], ultra-wideband channel modelling [75], chaotic time series modelling [625], identifying ARMAX models [207], nonlinear model identification [377, 302], nonlinear system identification [216, 311, 254, 115], model selection [104], power plants and systems [23, 323, 205], model order reduction [549].

3.19 Neural networks

Neural networks are used in combination with PSO in many applications. Some have already been listed under a different heading elsewhere. Here we list further PSO applications to neural networks (4% of the bibliography). Topics include: inversion of neural networks [437], neural network control for nonlinear processes [468], design of radial basis function networks [206, 433, 298], product unit networks [505, 217], neural gas networks [149], feedforward neural network training [309, 13, 643, 122, 177, 616, 57, 360, 58, 84, 523], design of recurrent neural networks [239, 241, 436, 446], cellular neural networks [151], wavelet neural networks [78], neuron controllers [123].

3.20 Prediction and forecasting

About 3% of the papers on applications in the bibliography have to do with prediction and forecasting. Topics include: water quality prediction and classification [658], prediction of chaotic systems [181, 318], ecological models [106], meteorological predictions [558], electric load forecasting [481, 476, 290, 387, 455, 147], battery pack state of charge estimation [417], time series prediction [53, 593, 615], predictions of elephant migrations [402], prediction of the flow stress in steel [303], prediction of surface roughness in end milling [134], streamflow forecast [308], urban traffic flow forecasting [649].

3.21 Power systems and plants

A large proportion (6%) of the application papers in the bibliography deals with power generation and power systems. Specific applications include (see also [33, 19]): automatic generation control [337], power transformer protection [133, 487], load forecasting [316], STATCOM power system [372, 105, 143], fault-tolerant control of compensators [423], optimal power dispatch [638, 131], power system performance optimisation [516, 286], secondary voltage control [225], power control and optimisation [515, 624, 517, 603, 601, 96, 626, 349, 637], design of power system stabilisers [102, 7, 101, 376, 5], control of photovoltaic systems [552], large-scale power plant control [188], operational planning for cogeneration systems [501], analysis of power quality signals [406], generation planning and restructuring [556], hybrid power generation systems [537, 142], optimal strategies for electricity production [342], power loss minimisation [141], production costing and operations planning [304].

3.22 Robotics

Numerous papers describing PSO applications in robotics are present in the literature. These cover about 3% of the applications' bibliography. Topics include: control of robotic manipulators and arms [619, 279, 26], motion planning and control [657], robot running [483], collective robotic search [108], unsupervised robotic learning [422], path planning [284, 210, 426, 74, 289], obstacle avoidance [370], swarm robotics [190, 291, 113], unmanned vehicle navigation [456], soccer playing [535], robot vision [475], transport robots [588], odour source localisation [221], environment mapping [186], voice control of robots [66].

3.23 Scheduling

About 6% of the bibliography deals with scheduling applications. These include: generator and transmission maintenance scheduling [263, 461, 285], flow shop scheduling [63, 327, 305, 62, 246], hydrothermal scheduling [503, 462], optimal operational planning of energy plants [261], blending scheduling [651], power generation scheduling [404, 161], tasks scheduling in distributed computer system [265, 310, 620, 72], scheduling in battery energy storage systems [482], job-shop scheduling [644, 561, 294, 403, 550, 488], radar time management [507], project scheduling [333], train scheduling [420], timetable scheduling [83], production scheduling [648, 647, 641], assembly scheduling [11], holonic manufacturing scheduling [596, 642, 645, 594, 646].

3.24 Security and Military

About 1.4% of the bibliography is devoted to security and military applications. These include: network security [471], security-constrained power generation [90], intrusion detection [119, 565], cryptography and cryptanalysis [278, 502], security border identification in power systems [252], weapon-target assignment [612], missile effectiveness optimisation [572].

3.25 Sensor Networks

13 papers (2%) are devoted to sensors and, particularly, sensor networks. Applications include: wireless sensor network sink node optimisation [361], ad hoc sensor networks node clustering [497], wireless sensor network design [606], estimation of target position in wireless sensor networks [389], cluster formation in wireless sensor networks [182], multicast routing in wireless sensor networks [605], odour source localisation [222], wireless video sensor networks optimisation [521], swarm based mobile sensor networks [511], sensor scheduling for target tracking [345], distributed sensor placement and topology planning [381, 382, 203].

3.26 Signal Processing

Approximately 4% of the bibliography is devoted to applications of PSO in signal processing. These include: pattern recognition of flatness signal [313], design of IIR filters [268, 267, 144], particle filter optimisation [499], nonlinear adaptive filters [266, 270, 269], Costas arrays [570], wavelets [228, 477, 478], blind detection [580, 636, 652], blind source separation [163, 393, 299, 299], analogue filter tuning [633], localisation of acoustic sources [409], distributed odour source localisation [220], speech coding [509, 613, 614], 2D IIR filters [145].

4 Conclusions

This paper presents a bird's eye view of PSO applications. This has been obtained by identifying and analysing around 700 PSO application papers stored in IEEE Xplore database at the time of writing.

The picture we obtain is that of a technique with an immense scope of applications, ranging from biological and medical, to electrical, electronic and electromagnetic, to practical computational intelligence applications, to combinatorial problem solving, to image analisis, signal processing and graphics, to robotics. What is particularly amazing is the rate of growth of PSO applications. As shown in Table 1, the number of publications reporting PSO applications has grown nearly exponential for the last few years, and seems to show no sign of slowing down at the present moment.

References

[1] Y.L. Abdel-Magid and M.A. Abido. Agc tuning of interconnected reheat thermal systems with particle swarm optimization. In *2003. ICECS 2003. Proceedings of the 2003 10th IEEE International Conference on Electronics, Circuits and Systems*, pages 376 – 379 Vol.1, 2003.

[2] A.M. Abdelbar and S. Abdelshahid. Instinct-based pso with local search applied to satisfiability. In *Neural Networks, 2004. Proceedings. 2004 IEEE International Joint Conference on*, pages 2291 – 2295 vol.3, 2004.

[3] A.M. Abdelbar, S. Ragab, and S. Mitri. Co-evolutionary particle swarm optimization applied to the 7/spl times/7 seega game. In *Neural Networks, 2004. Proceedings. 2004 IEEE International Joint Conference on*, 2004.

Table 1: PSO applications papers by year.

Year	IEEE Xplore
1995	(0)
1996	(0)
1997	(2)
1998	(3)
1999	(6)
2000	(10)
2001	(13)
2002	(36)
2003	(86)
2004	(270)
2005	(425)
2006	(687)

[4] A.M. Abdelbar, O. Soliman, S. Kinawy, and H. Sayed. An evolved seega player capable of strong novice-level play. In *Neural Networks, 2005. IJCNN '05. Proceedings. 2005 IEEE International Joint Conference on*, pages 332 – 336 vol. 1, 2005.

[5] A.A. Abido. Particle swarm optimization for multimachine power system stabilizer design. In *Power Engineering Society Summer Meeting, 2001. IEEE*, pages 1346 – 1351 vol.3, 2001.

[6] M.A. Abido. Optimal design of power-system stabilizers using particle swarm optimization. *IEEE Transactions on Energy Conversion*, 17:406 – 413, 2002.

[7] M.A. Abido, A.T. Al-Awami, and Y.L. Abdel-Magid. Analysis and design of upfc damping stabilizers for power system stability enhancement. In *Industrial Electronics, 2006 IEEE International Symposium on*, pages 2040 – 2045, 2006.

[8] T. Adhinarayanan and Maheswarapu Sydulu. Particle swarm optimisation for economic dispatch with cubic fuel cost function. In *TENCON 2006. 2006 IEEE Region 10 Conference*, pages 1 – 4, 2006.

[9] A.A. Adly and S.K. Abd-El-Hafiz. Using the particle swarm evolutionary approach in shape optimization and field analysis of devices involving nonlinear magnetic media. *IEEE Transactions on Magnetics*, 42:3150 – 3152, 2006.

[10] V. Aggarwal, Meng Mao, and U.-M. O'Reilly. A self-tuning analog proportional-integral-derivative (pid) controller. In *Adaptive Hardware and Systems, 2006. AHS 2006. First NASA/ESA Conference on*, pages 12 – 19, 2006.

[11] F.S. Al-Anzi and A. Allahverdi. Computer assembly scheduling problem. In *Service Systems and Service Management, 2006 International Conference on*, pages 1188 – 1191, 2006.

[12] W. Al-Hassan, M.B. Fayek, and S.I. Shaheen. Psosa: An optimized particle swarm technique for solving the urban planning problem. In *Computer Engineering and Systems, The 2006 International Conference on*, pages 401 – 405, 2006.

[13] B. Al-kazemi and C.K. Mohan. Training feedforward neural networks using multi-phase particle swarm optimization. In *Neural Information Processing, 2002. ICONIP '02. Proceedings of the 9th International Conference on*, pages 2615 – 2619 vol.5, 2002.

[14] N.A. Al-Musabi, Z.M. Al-Hatnouz, H.N. Al-Duwaish, and S. Al-Baiyat. Variable structure load frequency controller using particle swarm optimization technique. In *2003. ICECS 2003. Proceedings of the 2003 10th IEEE International Conference on Electronics, Circuits and Systems*, pages 380 – 383 Vol.1, 2003.

11

[15] A.K. Al-Othman and K.M. El-Nagger. Voltage flicker measurement using particle swarm optimization technique for power quality assessment. In *Electrotechnical Conference, 2006. MELECON 2006. IEEE Mediterranean*, pages 1077 – 1082, 2006.

[16] T.M. Alkhamis and M.A. Ahmed. Simulation-based optimization for repairable systems using particle swarm algorithm. In *Winter Simulation Conference, 2005 Proceedings of the*, page 5 pp., 2005.

[17] D.J. Allstot, Kiyong Choi, M. Chu, T. Kim, Xiaoyong Li, and J. Park. Parasitic-aware rf ic design. In *ASIC, 2003. Proceedings. 5th International Conference on*, pages 16 – 25 Vol.1, 2003.

[18] Jinho Parkand Kiyong Choiand D.J. Allstot. Parasitic-aware rf circuit design and optimization. *IEEE Transactions on [see also Circuits and Systems I: Fundamental Theory and Applications, IEEE Transactions on] Circuits and Systems I: Regular Papers*, 51:1953 – 1966, 2004.

[19] M. R. AlRashidi and M. E. El-Hawary. A survey of particle swarm optimization applications in electric power systems. *IEEE Transactions on Evolutionary Computation : Accepted for future publication*, PP:1 – 1, 2006.

[20] M.R. Alrashidi and M. E. El-Hawary. Emission-economic dispatch using a novel constraint handling particle swarm optimization strategy. In *Electrical and Computer Engineering, Canadian Conference on*, pages 664 – 669, 2006.

[21] M.R. AlRashidi and M.E. El-Hawary. Economic dispatch with environmental considerations using particle swarm optimization. In *Power Engineering, 2006 Large Engineering Systems Conference on*, pages 41 – 46, 2006.

[22] T. Amonchanchaigul and W. Kreesuradej. Input selection using binary particle swarm optimization. In *Computational Intelligence for Modelling, Control and Automation, 2006 and International Conference on Intelligent Agents, Web Technologies and Internet Commerce, International Conference on*, pages 159 – 159, 2006.

[23] T. Amraee, B. Mozafari, and A.M. Ranjbar. An improved model for optimal under voltage load shedding: particle swarm approach. In *Power India Conference, 2006 IEEE*, page 6 pp., 2006.

[24] L. Anton-Canalis, M. Hernandez-Tejera, and E. Sanchez-Nielsen. Particle swarms as video sequence inhabitants for object tracking in computer vision. In *Intelligent Systems Design and Applications, 2006. ISDA '06. Sixth International Conference on*, pages 604 – 609, 2006.

[25] H.K. Arachchi and W.A.C. Fernando. Pso based bit rate optimization for mpeg-1/2 video coding. In *2005. ICIP 2005. IEEE International Conference on Image Processing*, pages II – 329–32, 2005.

[26] A. Asmara, R.A. Krohling, and F. Hoffmann. Parameter tuning of a computed-torque controller for a 5 degree of freedom robot arm using co-evolutionary particle swarm optimization. In *Proceedings 2005 IEEE Swarm Intelligence Symposium, 2005. SIS 2005.*, pages 162 – 168, 2005.

[27] H.A. Awad. A novel particle swarm-based fuzzy control scheme. In *2006 IEEE International Conference on Fuzzy Systems*, pages 1939 – 1946, 2006.

[28] R. Azaro, G. Boato, M. Donelli, G. Franceschini, A. Martini, and A. Massa. Design of miniaturised ism-band fractal antenna. In *Electronics Letters*, pages 785 – 786, 2005.

[29] R. Azaro, G. Boato, M. Donelli, A. Massa, and E. Zeni. Design of a prefractal monopolar antenna for 3.43.6 ghz wi-max band portable devices. In *Antennas and Wireless Propagation Letters*, pages 116 – 119, 2006.

[30] R. Azaro, M. Donelli, F. De Natale, G. Franceschini, D. Franceschini, A. Massa, and S. Piffer. Frontiers in multiple-agents evolutionary techniques applied to adaptive arrays design. In *Antennas and Propagation Society International Symposium, 2005 IEEE*, pages 319 – 322 vol. 1B, 2005.

[31] R. Azaro, F.D. Natale, M. Donelli, E. Zeni, and A. Massa. Synthesis of a prefractal dual-band monopolar antenna for gps applications. In *Antennas and Wireless Propagation Letters*, pages 361 – 364, 2006.

[32] R. Azaro, F.G.B. De Natale, M. Donelli, A. Massa, and E. Zeni. Optimized design of a multifunction/multiband antenna for automotive rescue systems. *IEEE Transactions on Antennas and Propagation*, 54, 2006.

[33] Hua Bai and Bo Zhao. A survey on application of swarm intelligence computation to electric power system. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 7587 – 7591, 2006.

[34] S.M. Bamasak and M.A. Abido. Assessment study of shunt facts-based controllers effectiveness on power system stability enhancement. In *Universities Power Engineering Conference, 2004. UPEC 2004. 39th International*, pages 274 – 278 Vol. 1, 2004.

[35] G.Q. Bao, D. Zhang, J.H. Shi, and J.Z. Jiang. Optimal design for cogging torque reduction of transverse flux permanent motor using particle swarm optimization algorithm. In *Power Electronics and Motion Control Conference, 2004. IPEMC 2004. The 4th International*, pages 260 – 263 Vol.1, 2004.

[36] S. Baskar, A. Alphones, P.N. Suganthan, and J.J. Liang. Design of yagi-uda antennas using comprehensive learning particle swarm optimisation. In *Microwaves, Antennas and Propagation, IEE Proceedings -*, pages 340 – 346, 2005.

[37] S. Baskar, R.T. Zheng, A. Alphones, N.Q. Ngo, and P.N. Suganthan. Particle swarm optimization for the design of low-dispersion fiber bragg gratings. In *Photonics Technology Letters, IEEE*, pages 615 – 617, 2005.

[38] U. Baumgartner, C. Magele, K. Preis, and W. Renhart. Particle swarm optimisation for pareto optimal solutions in electromagnetic shape design. In *Science, Measurement and Technology, IEE Proceedings-*, pages 499 – 502, 2004.

[39] Z. Bayraktar, P.L. Werner, and D.H. Werner. Miniature three-element stochastic yagi-uda array optimization via particle swarm intelligence. In *Antennas and Propagation Society International Symposium, 2005 IEEE*, pages 263 – 266 vol. 2B, 2005.

[40] Z. Bayraktar, P.L. Werner, and D.H. Werner. The design of miniature three-element stochastic yagi-uda arrays using particle swarm optimization. In *Antennas and Wireless Propagation Letters*, pages 22 – 26, 2006.

[41] Z. Bayraktar, P.L. Werner, and D.H. Werner. Miniaturization of stochastic linear phased arrays via orthogonal design initialization and a hybrid particle swarm optimizer. In *Antennas and Propagation Society International Symposium 2006, IEEE*, pages 3531 – 3534, 2006.

[42] M. Benedetti, R. Azaro, D. Franceschini, and A. Massa. Pso-based real-time control of planar uniform circular arrays. In *Antennas and Wireless Propagation Letters*, pages 545 – 548, 2006.

[43] R. Bhattacharya, A. Joshi, and T.K. Bhattacharya. Pso-based evolutionary optimization for black-box modeling of arbitrary shaped on-chip rf inductors. In *Silicon Monolithic Integrated Circuits in RF Systems, 2006. Digest of Papers. 2006 Topical Meeting on*, page 4 pp., 2006.

[44] Wu Bin, Zhao Yanwei, Ma Yaliang, Dong Hongzhao, and Wang Weian. Particle swarm optimization method for vehicle routing problem. In *Intelligent Control and Automation, 2004. WCICA 2004. Fifth World Congress on*, pages 2219 – 2221 Vol.3, 2004.

[45] Yuan bin Mo and He tong Liu. The design of neural network direct inverse controller based on complex particle swarm optimization algorithm. In *Symbolic and Numeric Algorithms for Scientific Computing, 2006. SYNASC '06. Eighth International Symposium on*, pages 382 – 388, 2006.

[46] T.M. Blackwell and P. Bentley. Don't push me! collision-avoiding swarms. In *Evolutionary Computation, 2002. CEC '02. Proceedings of the 2002 Congress on*, pages 1691 – 1696, 2002.

[47] T.M. Blackwell and P. Bentley. Improvised music with swarms. In *Evolutionary Computation, 2002. CEC '02. Proceedings of the 2002 Congress on*, pages 1462 – 1467, 2002.

[48] D.W. Boeringer and D.H. Werner. A comparison of particle swarm optimization and genetic algorithms for a phased array synthesis problem. In *Antennas and Propagation Society International Symposium, 2003. IEEE*, pages 181 – 184 vol.1, 2003.

[49] D.W. Boeringer and D.H. Werner. Particle swarm optimization versus genetic algorithms for phased array synthesis. *IEEE Transactions on Antennas and Propagation*, 52:771 – 779, 2004.

[50] D.W. Boeringer and D.H. Werner. Efficiency-constrained particle swarm optimization of a modified bernstein polynomial for conformal array excitation amplitude synthesis. *IEEE Transactions on Antennas and Propagation*, 53, 2005.

[51] W. Brinkman and Thayananthan Thayaparan. Focusing isar images using the ajtf optimized with the ga and the pso algorithm-comparison and results. In *2006 IEEE Conference on Radar*, page 8 pp., 2006. 24-27 April 2006.

[52] D.J. Broderick and J.Y. Hung. Feedback linearization of an electrostatic actuator by particle swarm optimization. In *Industrial Electronics, 2006 IEEE International Symposium on*, pages 289 – 294, 2006.

[53] X. Cai, N. Zhang, G.K. Venayagamoorthy, and II Wunsch D.C. Time series prediction with recurrent neural networks using a hybrid pso-ea algorithm. In *Neural Networks, 2004. Proceedings. 2004 IEEE International Joint Conference on*, pages 1647 – 1652 vol.2, 2004.

[54] Xindi Cai and II Wunsch D.C. Engine data classification with simultaneous recurrent network using a hybrid pso-ea algorithm. In *Neural Networks, 2005. IJCNN '05. Proceedings. 2005 IEEE International Joint Conference on*, pages 2319 – 2323 vol. 4, 2005.

[55] Chengzhi Cao, Bo Zhou, Min Li, and Jing Du. Digital implementation of dtc based on pso for induction motors. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 6349 – 6352, 2006.

[56] G. Di Caro, F. Ducatelle, and L.M. Gambardella. Swarm intelligence for routing in mobile ad hoc networks. In *Proceedings 2005 IEEE Swarm Intelligence Symposium, 2005. SIS 2005.*, pages 76 – 83, 2005.

[57] M. Carvalho and T.B. Ludermir. An analysis of pso hybrid algorithms for feed-forward neural networks training. In *Neural Networks, 2006. SBRN '06. Ninth Brazilian Symposium on*, pages 2 – 2, 2006.

[58] M. Carvalho and T.B. Ludermir. Particle swarm optimization of feed-forward neural networks with weight decay. In *Hybrid Intelligent Systems, 2006. HIS '06. Sixth International Conference on*, pages 5 – 5, 2006.

[59] W. Cedefto and D. Agraflotis. Particle swarms for drug design. In *The 2005 IEEE Congress on Evolutionary Computation, 2005.*, pages 1218 – 1225 Vol. 2, 2005.

[60] W. Cedeno and D. Agrafiotis. A comparison of particle swarms techniques for the development of quantitative structure-activity relationship models for drug design. In *Computational Systems Bioinformatics Conference, 2005. Workshops and Poster Abstracts. IEEE*, pages 322 – 331, 2005.

[61] K. Chandramouli and E. Izquierdo. Image classification using chaotic particle swarm optimization. In *2006 IEEE International Conference on Image Processing*, pages 3001 – 3004, 2006.

[62] S. Chandrasekaran, S.G. Ponnambalam, R.K. Suresh, and N. Vijayakumar. An application of particle swarm optimization algorithm to permutation flowshop scheduling problems to minimize makespan, total flowtime and completion time variance. In *2006. CASE '06. IEEE International Conference on Automation Science and Engineering*, pages 513 – 518, 2006.

[63] S. Chandrasekaran, S.G. Ponnambalam, R.K. Suresh, and N. Vijayakumar. A hybrid discrete particle swarm optimization algorithm to solve flow shop scheduling problems. In *2006 IEEE Conference on Cybernetics and Intelligent Systems*, pages 1 – 6, 2006. June 2006.

[64] Xiao-Yu Chang, Chun-Guang Zhou, Yan-Wen Li, and Ping Hu. Identification of transcription factor binding sites using ga and pso. In *Intelligent Systems Design and Applications, 2006. ISDA '06. Sixth International Conference on*, pages 473 – 480, 2006.

[65] Xie Chao, Wei Chengjian, and Xu Jun. Evolutionary wavelet-based similarity search in image databases. In *VLSI Design and Video Technology, 2005. Proceedings of 2005 IEEE International Workshop on*, pages 385 – 388, 2005.

[66] A. Chatterjee, K. Pulasinghe, K. Watanabe, and K. Izumi. A particle-swarm-optimized fuzzy-neural network for voice-controlled robot systems. *IEEE Transactions on Industrial Electronics*, 52:1478 – 1489, 2005.

[67] C. H. Chen and S. N. Yeh. Particle swarm optimization for economic power dispatch with valve-point effects. In *Transmission & Distribution Conference and Exposition: Latin America, 2006. TDC '06. IEEE/PES*, pages 1 – 5, 2006.

[68] Ching-Han Chen and Chia-Te Chu. Low complexity iris recognition based on wavelet probabilistic neural networks. In *Neural Networks, 2005. IJCNN '05. Proceedings. 2005 IEEE International Joint Conference on*, pages 1930 – 1935 vol. 3, 2005.

[69] Ching-Yi Chen and Fun Ye. Particle swarm optimization algorithm and its application to clustering analysis. In *2004 IEEE International Conference on Networking, Sensing and Control*, pages 789 – 794 Vol.2, 2004.

[70] Junfeng Chen, Ziwu Ren, and Xinnan Fan. Particle swarm optimization with adaptive mutation and its application research in tuning of pid parameters. In *Systems and Control in Aerospace and Astronautics, 2006. ISSCAA 2006. 1st International Symposium on*, page 5 pp., 2006.

[71] T.B. Chen, Y.B. Chen, Y.C. Jiao, and E.S. Zhang. Synthesis of antenna array using particle swarm optimization. In *Microwave Conference Proceedings, 2005. APMC 2005. Asia-Pacific Conference Proceedings*, page 4 pp., 2005.

[72] Tingwei Chen, Bin Zhang, Xianwen Hao, and Yu Dai. Task scheduling in grid based on particle swarm optimization. In *Parallel and Distributed Computing, 2006. ISPDC '06. The Fifth International Symposium on*, pages 238 – 245, 2006.

[73] Wei Chen, Run-Tong Zhang, Yong-Ming Cai, and Fa-Sheng Xu. Particle swarm optimization for constrained portfolio selection problems. In *Machine Learning and Cybernetics, 2006 International Conference on*, pages 2425 – 2429, 2006.

[74] Xin Chen and Yangmin Li. Smooth path planning of a mobile robot using stochastic particle swarm optimization. In *Proceedings of the 2006 IEEE International Conference on Mechatronics and Automation*, pages 1722 – 1727, 2006.

[75] Yifan Chen and V.K. Dubey. Ultrawideband source localization using a particle-swarm-optimized capon estimator. In *2005. ICC 2005. 2005 IEEE International Conference on Communications*, pages 2825 – 2829 Vol. 4, 2005.

[76] Ying Chen and Qi-Guang Zhu. A novel adaptive pmd compensation system based on pso algorithm. In *Machine Learning and Cybernetics, 2006 International Conference on*, pages 344 – 349, 2006.

[77] Yue-Cheng Chen, Hsin-Chih Wang, and Te-Jen Su. Particle swarm optimization for image noise cancellation. In *Innovative Computing, Information and Control, 2006. ICICIC '06. First International Conference on*, pages 587 – 590, 2006.

[78] Yuehui Chen, Jiwen Dong, Bo Yang, and Yong Zhang. A local linear wavelet neural network. In *Intelligent Control and Automation, 2004. WCICA 2004. Fifth World Congress on*, pages 1954 – 1957 Vol.3, 2004.

[79] Yuehui Chen, Shuyan Jiang, and A. Abraham. Face recognition using dct and hybrid flexible neural tree. In *Neural Networks and Brain, 2005. ICNN&B '05. International Conference on*, pages 1459 – 1463, 2005.

[80] Yuehui Chen, Lizhi Peng, and A. Abraham. Programming hierarchical ts fuzzy systems. In *Evolving Fuzzy Systems, 2006 International Symposium on*, pages 157 – 162, 2006.

[81] Chia Te Chu and Ching-Han Chen. High performance iris recognition based on lda and lpcc. In *2005. ICTAI 05. 17th IEEE International Conference on Tools with Artificial Intelligence*, page 5 pp., 2005.

[82] Min Chu and D.J. Allstot. An elitist distributed particle swarm algorithm for rfic optimization. In *Design Automation Conference, 2005. Proceedings of the ASP-DAC 2005. Asia and South Pacific*, pages 671 – 674 Vol. 2, 2005.

[83] Shu-Chuan Chu, Yi-Tin Chen, and Jiun-Huei Ho. Timetable scheduling using particle swarm optimization. In *Innovative Computing, Information and Control, 2006. ICICIC '06. First International Conference on*, pages 324 – 327, 2006.

[84] Zhang Chunkai, Li Yu, and Shao Huihe. A new evolved artificial neural network and its application. In *Intelligent Control and Automation, 2000. Proceedings of the 3rd World Congress on*, pages 1065 – 1068 vol.2, 2000.

[85] V.A. Cicirello, A. Mroczkowski, and W. Regli. Designing decentralized software for a wireless network environment: evaluating patterns of mobility for a mobile agent swarm. In *Multi-Agent Security and Survivability, 2005 IEEE 2nd Symposium on*, pages 49 – 57, 2005.

[86] V. Ciesielski, G. Wijesinghe, A. Innes, and S. John. Analysis of the superiority of parameter optimization over genetic programming for a difficult object detection problem. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 1264 – 1271, 2006.

[87] G. Coath, M. Al-Dabbagh, and S.K. Halgamuge. Particle swarm optimisation for reactive power and voltage control with grid-integrated wind farms. In *Power Engineering Society General Meeting, 2004. IEEE*, pages 303 – 308 Vol.1, 2004.

[88] C.A. Coello Coello, E.H. Luna, and A.H. Aguirre. A comparative study of encodings to design combinational logic circuits using particle swarm optimization. In *Evolvable Hardware, 2004. Proceedings. 2004 NASA/DoD Conference on*, pages 71 – 78, 2004.

[89] S.C.M. Cohen and L.N. de Castro. Data clustering with particle swarms. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 1792 – 1798, 2006.

[90] R. Collett and J. Quaicoe. Security-constrained unit commitment using particle swarms. In *Electrical and Computer Engineering, Canadian Conference on*, pages 1125 – 1129, 2006.

[91] Av.E. Conradie, R. Miikkulainen, and C. Aldrich. Intelligent process control utilising symbiotic memetic neuro-evolution. In *Evolutionary Computation, 2002. CEC '02. Proceedings of the 2002 Congress on*, pages 623 – 628, 2002.

[92] J. Conradie and A.P. Engelbrecht. Training bao game-playing agents using coevolutionary particle swarm optimization. In *Computational Intelligence and Games, 2006 IEEE Symposium on*, pages 67 – 74, 2006.

[93] S. Cui and D.S. Weile. Application of a parallel particle swarm optimization scheme to the design of electromagnetic absorbers. *IEEE Transactions on Antennas and Propagation*, 53:3616 – 3624, 2005.

[94] Suomin Cui and D.S. Weile. Application of a novel parallel particle swarm optimization to the design of electromagnetic absorbers. In *Antennas and Propagation Society International Symposium, 2005 IEEE*, pages 41 – 44 vol. 2A, 2005.

[95] X. Cui, T.E. Potok, and P. Palathingal. Document clustering using particle swarm optimization. In *Proceedings 2005 IEEE Swarm Intelligence Symposium, 2005. SIS 2005.*, pages 185 – 191, 2005.

[96] A.P. Alves da Silva and P.J. Abrao. Applications of evolutionary computation in electric power systems. In *Evolutionary Computation, 2002. CEC '02. Proceedings of the 2002 Congress on*, pages 1057 – 1062, 2002.

[97] Jianhua Dai, Weidong Chen, Hongying Gu, and Yunhe Pan. Particle swarm algorithm for minimal attribute reduction of decision data tables. In *Computer and Computational Sciences, 2006. IMSCCS '06. First International Multi-Symposiums on*, pages 572 – 575, 2006.

[98] S. Das, A. Abraham, and A. Konar. Spatial information based image segmentation using a modified particle swarm optimization algorithm. In *Intelligent Systems Design and Applications, 2006. ISDA '06. Sixth International Conference on*, pages 438 – 444, 2006.

[99] S. Das, A. Abraham, and S.K. Sarkar. A hybrid rough set–particle swarm algorithm for image pixel classification. In *Hybrid Intelligent Systems, 2006. HIS '06. Sixth International Conference on*, pages 26 – 26, 2006.

[100] T.K. Das, S.R. Jetti, and G.K. Venayagamoorthy. Optimal design of svc damping controllers with wide area measurements using small population based pso. In *Neural Networks, 2006. IJCNN '06. International Joint Conference on*, pages 2255 – 2260, 2006.

[101] T.K. Das and G.K. Venayagamoorthy. Bio-inspired algorithms for the design of multiple optimal power system stabilizers: Sppso and bfa. In *The 2006 IEEE Industry Applications Conference Forty-First IAS Annual Meeting, Conference Record of*, pages 635 – 641, 2006.

[102] T.K. Das and G.K. Venayagamoorthy. Optimal design of power system stabilizers using a small population based pso. In *Power Engineering Society General Meeting, 2006. IEEE*, page 7 pp., 2006.

[103] P.B. de Moura Oliveira. Modern heuristics review for pid control optimization: a teaching experiment. In *Control and Automation, 2005. ICCA '05. International Conference on*, pages 828 – 833 Vol. 2, 2005.

[104] B.F. de Souza, A.C.P.L.F. de Carvalho, R. Calvo, and R.P. Ishii. Multiclass svm model selection using particle swarm optimization. In *Hybrid Intelligent Systems, 2006. HIS '06. Sixth International Conference on*, pages 31 – 31, 2006.

[105] Y. del Valle, J. C. Hernandez, G. K. Venayagamoorthy, and R. G. Harley. Optimal statcom sizing and placement using particle swarm optimization. In *Transmission & Distribution Conference and Exposition: Latin America, 2006. TDC '06. IEEE/PES*, pages 1 – 6, 2006.

[106] Changhui Deng, XinJiang Wei, and LianXi Guo. Application of neural network based on pso algorithm in prediction model for dissolved oxygen in fishpond. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 9401 – 9405, 2006.

[107] Z.A. Dindar and T. Marwala. Option pricing using a committee of neural networks and optimized networks. In *2004 IEEE International Conference on Systems, Man and Cybernetics*, pages 434 – 438 vol.1, 2004.

[108] S. Doctor, G.K. Venayagamoorthy, and V.G. Gudise. Optimal pso for collective robotic search applications. In *Evolutionary Computation, 2004. CEC2004. Congress on*, pages 1390 – 1395 Vol.2, 2004.

[109] M. Donelli, R. Azaro, F.G.B. De Natale, and A. Massa. An innovative computational approach based on a particle swarm strategy for adaptive phased-arrays control. *IEEE Transactions on Antennas and Propagation*, 54:888 – 898, 2006.

[110] M. Donelli and A. Massa. Computational approach based on a particle swarm optimizer for microwave imaging of two-dimensional dielectric scatterers. *IEEE Transactions on Microwave Theory and Techniques*, 53:1761 – 1776, 2005.

[111] Ze Dong, Pu Han, Dongfeng Wang, and Songming Jiao. Thermal process system identification using particle swarm optimization. In *Industrial Electronics, 2006 IEEE International Symposium on*, pages 194 – 198, 2006.

[112] Shing-Hwang Doong. Protein homology modeling with heuristic search for sequence alignment. In *System Sciences, 2007. HICSS 2007. 40th Annual Hawaii International Conference on*, pages 128 – 128, 2007.

[113] M. Dorigo. Swarm-bot: an experiment in swarm robotics. In *Proceedings 2005 IEEE Swarm Intelligence Symposium, 2005. SIS 2005.*, pages 192 – 200, 2005.

[114] L. dos Santos Coelho and B. Meirelles Herrera. Fuzzy modeling using chaotic particle swarm approaches applied to a yo-yo motion system. In *2006 IEEE International Conference on Fuzzy Systems*, pages 2293 – 2298, 2006.

[115] L. dos Santos Coelho and R.A. Krohling. Nonlinear system identification based on b-spline neural network and modified particle swarm optimization. In *Neural Networks, 2006. IJCNN '06. International Joint Conference on*, pages 3748 – 3753, 2006.

[116] L. dos Santos Coelho and V. Cocco Mariani. Use of cultural particle swarm optimization for loneys solenoids design. In *2006 12th Biennial IEEE Conference on Electromagnetic Field Computation*, pages 482 – 482, 2006. 2006.

[117] L. dos Santos Coelho and V.C. Mariani. An efficient particle swarm optimization approach based on cultural algorithm applied to mechanical design. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 1099 – 1104, 2006.

[118] G. Dozier, W. Britt, M.P. SanSoucie, P.V. Hull, M.L. Tinker, R. Unger, S. Bancroft, T. Moeller, and D. Rooney. Evolving high-performance evolutionary computations for space vehicle design. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 2201 – 2207, 2006.

[119] G. Dozier, D. Brown, J. Hurley, and K. Cain. Vulnerability analysis of ais-based intrusion detection systems via genetic and particle swarm red teams. In *Evolutionary Computation, 2004. CEC2004. Congress on*, pages 111 – 116 Vol.1, 2004.

[120] Guang-Yu Du, Tian-Shu Huang, Li-Xin Song, and Bing-Jie Zhao. A novel fast motion estimation method based on particle swarm optimization. In *Proceedings of 2005 International Conference on Machine Learning and Cybernetics, 2005.*, pages 5038 – 5042 Vol. 8, 2005.

[121] Ji-Xiang Du, De-Shuang Huang, Jun Zhang, and Xiao-Feng Wang. Shape matching using fuzzy discrete particle swarm optimization. In *Proceedings 2005 IEEE Swarm Intelligence Symposium, 2005. SIS 2005.*, pages 405 – 408, 2005.

[122] Shiqiang Du, Wanshe Li, and Kai Cao. A learning algorithm of artificial neural network based on ga - pso. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 3633 – 3637, 2006.

[123] Yaping Du, Ning Wang, and Jianming Zhang. An optimum design method based on pso algorithm for neuron controllers. In *Intelligent Control and Automation, 2004. WCICA 2004. Fifth World Congress on*, pages 2617 – 2621 Vol.3, 2004.

[124] H. Dubreil, Z. Altman, V. Diascorn, J.-M. Picard, and M. Clerc. Particle swarm optimization of fuzzy logic controller for high quality rrm auto-tuning of umts networks. In *Vehicular Technology Conference, 2005. VTC 2005-Spring. 2005 IEEE 61st*, pages 1865 – 1869 Vol. 3, 2005.

[125] R. Eberhart and Yuhui Shi. Particle swarm optimization and its applications to vlsi design and video technology. In *VLSI Design and Video Technology, 2005. Proceedings of 2005 IEEE International Workshop on*, pages xxiii – xxiii, 2005.

[126] R.C. Eberhart and Xiaohui Hu. Human tremor analysis using particle swarm optimization. In *Evolutionary Computation, 1999. CEC 99. Proceedings of the 1999 Congress on*, 1999.

[127] A. Edwards and A.P. Engelbrecht. Comparing particle swarm optimisation and genetic algorithms for nonlinear mapping. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 694 – 701, 2006.

[128] A.I. Edwards, A.P. Engelbrecht, and N. Franken. Nonlinear mapping using particle swarm optimisation. In *IEEE Congress on Evolutionary Computation, 2005. The 2005*, pages 306 – 313 Vol.1, 2005.

[129] M.A. Ei-Sharkawi and II Marks R.J. Missing sensors restoration for system control and diagnostics. In *Diagnostics for Electric Machines, Power Electronics and Drives, 2003. SDEMPED 2003. 4th IEEE International Symposium on*, pages 338 – 341, 2003.

[130] E.E. El-Araby and N. Yorino. A particle swarm optimization-based approach for pricing var providers in the electricity market with the consideration of voltage security. In *Future Power Systems, 2005 International Conference on*, page 6 pp., 2005.

[131] A. El-Gallad, M. El-Hawary, A. Sallam, and A. Kalas. Particle swarm optimizer for constrained economic dispatch with prohibited operating zones. In *Electrical and Computer Engineering, 2002. IEEE CCECE 2002. Canadian Conference on*, pages 78 – 81 vol.1, 2002.

[132] A.I. El-Gallad, M. El-Hawary, A.A. Sallam, and A. Kalas. Swarm intelligence for hybrid cost dispatch problem. In *Electrical and Computer Engineering, 2001. Canadian Conference on*, pages 753 – 757 vol.2, 2001.

[133] A.I. El-Gallas, M. El-Hawary, A.A. Sallam, and A. Kalas. Swarm-intelligently trained neural network for power transformer protection. In *Electrical and Computer Engineering, 2001. Canadian Conference on*, pages 265 – 269 vol.1, 2001.

[134] H. El-Mounayri, Z. Dugla, and Haiyan Deng. Prediction of surface roughness in end milling using swarm intelligence. In *the 2003 IEEE Swarm Intelligence Symposium, 2003. SIS '03. Proceedings of*, pages 220 – 227, 2003.

[135] A. Elgallad, M. El-Hawary, W. Phillips, and A. Sallam. Pso-based neural network for dynamic bandwidth re-allocation [power system communication]. In *Power Engineering 2002 Large Engineering Systems Conference on, LESCOPE 02*, pages 98 – 102, 2002.

[136] Hassan M. Elkamchouchi and May Mansour Wagih. Dynamic null steering in linear antenna arrays using adaptive particle swarm optimization algorithm. In *Wireless and Mobile Communications, 2007. ICWMC '07. Third International Conference on*, pages 24 – 24, 2007.

[137] A.S. Elwer, S.A. Wahsh, M.O. Khalil, and A.M. Nur-Eldeen. Intelligent fuzzy controller using particle swarm optimization for control of permanent magnet synchronous motor for electric vehicle. In *Industrial Electronics Society, 2003. IECON '03. The 29th Annual Conference of the IEEE*, pages 1762 – 1766 Vol.2, 2003.

[138] H.M. Emara, M.E. Ammar, A. Bahgat, and H.T. Dorrah. Stator fault estimation in induction motors using particle swarm optimization. In *Electric Machines and Drives Conference, 2003. IEMDC'03. IEEE International*, pages 1469 – 1475 vol.3, 2003.

[139] A.A.A. Esmin, A.R. Aoki, and G. Lambert-Torres. Particle swarm optimization for fuzzy membership functions optimization. In *2002 IEEE International Conference on Systems, Man and Cybernetics*, page 6 pp. vol.3, 2002.

[140] A.A.A. Esmin and G. Lambert-Torres. Fitting fuzzy membership functions using hybrid particle swarm optimization. In *2006 IEEE International Conference on Fuzzy Systems*, pages 2112 – 2119, 2006.

[141] A.A.A. Esmin and G. Lambert-Torres. Loss power minimization using particle swarm optimization. In *Neural Networks, 2006. IJCNN '06. International Joint Conference on*, pages 1988 – 1992, 2006.

[142] A.A.A. Esmin, G. Lambert-Torres, and A.C. Zambroni de Souza. A hybrid particle swarm optimization applied to loss power minimization. *IEEE Transactions on Power Systems*, 20:859 – 866, 2005.

[143] S.F. Faisal and A.H.M.A. Rahim. A robust statcom damping controller for a multi-machine power system. In *Power Engineering Conference, 2005. IPEC 2005. The 7th International*, 2005.

[144] Wei Fang, Jun Sun, and Wenbo Xu. Analysis of adaptive iir filter design based on quantum-behaved particle swarm optimization. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 3396 – 3400, 2006.

[145] Wei Fang, Jun Sun, and Wenbo Xu. Design of two-dimensional recursive filters by using quantum-behaved particle swarm optimization. In *Intelligent Information Hiding and Multimedia Signal Processing, 2006. IIH-MSP '06. International Conference on*, pages 240 – 243, 2006.

[146] Hsuan-Ming Feng. Particle swarm optimization learning fuzzy systems design. In *Information Technology and Applications, 2005. ICITA 2005. Third International Conference on*, pages 363 – 366 vol.1, 2005.

[147] Li Feng, Jianjun He, Qingyun Kong, and Lin Guo. Application of multi-objective algorithm based on particle swarm optimization in electrical short-term load forecasting. In *Power System Technology, 2006. PowerCon 2006. International Conference on*, pages 1 – 5, 2006.

[148] Xu feng Liu, Yong chang Jiao, Fu shun Zhang, and Yi bo Chen. Design of a conformal microstrip antenna array mounted on an irregular dielectric surface. In *Microwave Conference Proceedings, 2005. APMC 2005. Asia-Pacific Conference Proceedings*, page 3 pp., 2005.

[149] C.J. Figueroa, P.A. Estevez, and R.E. Hernandez. Nonlinear mappings based on particle swarm optimization. In *Neural Networks, 2005. IJCNN '05. Proceedings. 2005 IEEE International Joint Conference on*, pages 1487 – 1492 vol. 3, 2005.

[150] H.A. Firpi and E. Goodman. Swarmed feature selection. In *Applied Imagery Pattern Recognition Workshop, 2004. Proceedings. 33rd*, pages 112 – 118, 2004.

[151] H.A. Firpi and E.D. Goodman. Designing templates for cellular neural networks using particle swarm optimization. In *Applied Imagery Pattern Recognition Workshop, 2004. Proceedings. 33rd*, pages 119 – 123, 2004.

[152] D. Franceschini and A. Massa. An integrated stochastic multi-scaling strategy for microwave imaging applications. In *Antennas and Propagation Society International Symposium, 2005 IEEE*, pages 209 – 212 Vol. 1A, 2005.

[153] N. Franken and A.P. Engelbrecht. Comparing pso structures to learn the game of checkers from zero knowledge. In *Evolutionary Computation, 2003. CEC '03. The 2003 Congress on*, pages 234 – 241 Vol.1, 2003.

[154] N. Franken and A.P. Engelbrecht. Pso approaches to coevolve ipd strategies. In *Evolutionary Computation, 2004. CEC2004. Congress on*, pages 356 – 363 Vol.1, 2004.

[155] N. Franken and A.P. Engelbrecht. Investigating binary pso parameter influence on the knights cover problem. In *IEEE Congress on Evolutionary Computation, 2005. The 2005*, pages 282 – 289 Vol.1, 2005.

[156] Y. Fukuyama and H. Yoshida. A particle swarm optimization for reactive power and voltage control in electric power systems. In *Evolutionary Computation, 2001. Proceedings of the 2001 Congress on*, pages 87 – 93 vol. 1, 2001.

[157] Bao Fumin, Li Aiguo, and Qin Zheng. Photo time-stamp recognition based on particle swarm optimization. In *Web Intelligence, 2004. WI 2004. Proceedings. IEEE/WIC/ACM International Conference on*, pages 529 – 532, 2004.

[158] Zwe-Lee Gaing. Particle swarm optimization to solving the economic dispatch considering the generator constraints. *IEEE Transactions on Power Systems*, 18:1187 – 1195, 2003.

[159] Zwe-Lee Gaing. Constrained dynamic economic dispatch solution using particle swarm optimization. In *Power Engineering Society General Meeting, 2004. IEEE*, pages 153 – 158 Vol.1, 2004.

[160] Zwe-Lee Gaing. A particle swarm optimization approach for optimum design of pid controller in avr system. *IEEE Transactions on Energy Conversion*, 19:384 – 391, 2004.

[161] Zwe-Lee Gaing and Rung-Fang Chang. Security-constrained economic scheduling of generation considering generator constraints. In *Power System Technology, 2006. PowerCon 2006. International Conference on*, pages 1 – 7, 2006.

[162] Fei Gao and Hengqing Tong. Control a novel discrete chaotic system through particle swarm optimization. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 3330 – 3334, 2006.

[163] Ying Gao and Shengli Xie. A blind source separation algorithm using particle swarm optimization. In *Emerging Technologies: Frontiers of Mobile and Wireless Communication, 2004. Proceedings of the IEEE 6th Circuits and Systems Symposium on*, pages 297 – 300 Vol.1, 2004.

[164] S. Genovesi, R. Mittra, A. Monorchio, and G. Manara. Particle swarm optimization for the design of frequency selective surfaces. In *Antennas and Wireless Propagation Letters*, pages 277 – 279, 2006.

[165] S. Genovesi, R. Mittra, A. Monorchio, and G. Manara. Particle swarm optimization of frequency selective surfaces for the design of artificial magnetic conductors. In *Antennas and Propagation Society International Symposium 2006, IEEE*, pages 3519 – 3522, 2006.

[166] Simone Genovesi, Agostino Monorchio, Raj Mittra, and Giuliano Manara. A sub-boundary approach for enhanced particle swarm optimization and its application to the design of artificial magnetic conductors. *IEEE Transactions on Antennas and Propagation*, 55, 2007.

[167] M. Ghannad-Rezaie, H. Soltanain-Zadehand, M.-R. Siadat, and K.V. Elisevich. Medical data mining using particle swarm optimization for temporal lobe epilepsy. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 761 – 768, 2006.

[168] D. Gies and Y. Rahmat-Samii. Reconfigurable array design using parallel particle swarm optimization. In *Antennas and Propagation Society International Symposium, 2003. IEEE*, pages 177 – 180 vol.1, 2003.

[169] D. Gies and Y. Rahmat-Samii. Particle swarm optimization (pso) for reflector antenna shaping. In *Antennas and Propagation Society International Symposium, 2004. IEEE*, pages 2289 – 2292 Vol.3, 2004.

[170] E.F.G. Goldbarg, G.R. de Souza, and M.C. Goldbarg. Particle swarm optimization for the bi-objective degree constrained minimum spanning tree. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 420 – 427, 2006.

[171] E. Granger, P. Henniges, L.S. Oliveira, and R. Sabourin. Particle swarm optimization of fuzzy artmap parameters. In *Neural Networks, 2006. IJCNN '06. International Joint Conference on*, pages 2060 – 2067, 2006.

[172] F. Grimaccia, M. Mussetta, P. Pirinoli, and R.E. Zich. Optimization of a reflectarray antenna via hybrid evolutionary algorithms. In *Electromagnetic Compatibility, 2006. EMC-Zurich 2006. 17th International Zurich Symposium on*, pages 254 – 257, 2006.

[173] Francesco Grimaccia, Marco Mussetta, and Riccardo E. Zich. Genetical swarm optimization: Self-adaptive hybrid evolutionary algorithm for electromagnetics. *IEEE Transactions on Antennas and Propagation*, 55, 2007.

[174] E.A. Grimaldi, A. Gandelli, F. Grimaccia, M. Mussetta, and R.E. Zich. A new hybrid evolutionary algorithm for high dimension electromagnetic problems. In *Antennas and Propagation Society International Symposium, 2005 IEEE*, pages 61 – 64 vol. 2A, 2005.

[175] E.A. Grimaldi, F. Grimaccia, M. Mussetta, P. Pirinoli, and R.E. Zich. Genetical swarm optimization: a new hybrid evolutionary algorithm for electromagnetic applications. In *Applied Electromagnetics and Communications, 2005. ICECom 2005. 18th International Conference on*, pages 1 – 4, 2005.

[176] E.A. Grimaldi, F. Grimaccia, M. Mussetta, P. Pirinoli, and R.F. Zich. A new hybrid genetical-swarm algorithm for electromagnetic optimization. In *Computational Electromagnetics and Its Applications, 2004. Proceedings. ICCEA 2004. 2004 3rd International Conference on*, pages 157 – 160, 2004.

[177] E.A. Grimaldi, F. Grimaccia, M. Mussetta, and R.E. Zich. Pso as an effective learning algorithm for neural network applications. In *Computational Electromagnetics and Its Applications, 2004. Proceedings. ICCEA 2004. 2004 3rd International Conference on*, pages 557 – 560, 2004.

[178] Jing-Hua Guan, Da-You Liu, Hai-Yang Jia, and Peng Yu. An effective clustering method using a discrete particle swarm optimization algorithm-based hybrid approach. In *Machine Learning and Cybernetics, 2006 International Conference on*, pages 1114 – 1119, 2006.

[179] V.G. Gudise and G.K. Venayagamoorthy. Evolving digital circuits using particle swarm. In *Neural Networks, 2003. Proceedings of the International Joint Conference on*, pages 468 – 472 vol.1, 2003.

[180] V.G. Gudise and G.K. Venayagamoorthy. Fpga placement and routing using particle swarm optimization. In *VLSI, 2004. Proceedings. IEEE Computer society Annual Symposium on*, pages 307 – 308, 2004.

[181] F.A. Guerra and L.D.S. Coelho. Radial basis neural network learning based on particle swarm optimization to multistep prediction of chaotic lorenz's system. In *Hybrid Intelligent Systems, 2005. Fifth International Conference on*, page 3 pp., 2005.

[182] S.M. Guru, S.K. Halgamuge, and S. Fernando. Particle swarm optimisers for cluster formation in wireless sensor networks. In *Intelligent Sensors, Sensor Networks and Information Processing Conference, 2005. Proceedings of the 2005 International Conference on*, pages 319 – 324, 2005.

[183] R.H.A. Hamid, A.M.A. Amin, R.S. Ahmed, and A.A.A. El-Gammal. New technique for maximum efficiency of induction motors based on particle swarm optmization (pso). In *Industrial Electronics, 2006 IEEE International Symposium on*, pages 2176 – 2181, 2006.

[184] Pu Han, Yu Huang, Zeng-Zhou Jia, Dong-Feng Wang, and Yong-Ling Li. Mixed h/spl i.bar/2/h/spl i.bar//spl infin/ optimal pid control for superheated steam temperature system based on pso optimization. In *Machine Learning and Cybernetics, 2005. Proceedings of 2005 International Conference on*, pages 960 – 964 Vol. 2, 2005.

[185] Wan-Jun Hao, Yan-Hui Qiao, Guo-Liang Liu, and Wen-Yi Qiang. Fuzzy controller design and parameter optimization. In *Machine Learning and Cybernetics, 2006 International Conference on*, pages 489 – 493, 2006.

[186] C.T. Hardin, X. Cui, R.K. Ragade, J.H. Graham, and A.S. Elmaghraby. A modified particle swarm algorithm for robotic mapping of hazardous environments. In *World Automation Congress, 2004. Proceedings*, pages 31 – 36, 2004.

[187] C.T. Hardin and E.C. Rouchka. Dna motif detection using particle swarm optimization and expectation-maximization. In *Proceedings 2005 IEEE Swarm Intelligence Symposium, 2005. SIS 2005.*, pages 181 – 184, 2005.

23

[188] J.S. Heo and K.Y. Lee. A multi-agent system-based intelligent heuristic optimal control system for a large-scale power plant. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 1544 – 1551, 2006.

[189] J.S. Heo, K.Y. Lee, and R. Garduno-Ramirez. Multiobjective control of power plants using particle swarm optimization techniques. *IEEE Transactions on Energy Conversion*, 21:552 – 561, 2006.

[190] J.M. Hereford. A distributed particle swarm optimization algorithm for swarm robotic applications. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 1678 – 1685, 2006.

[191] J.M. Hereford and T. Kuyucu. Robust neural networks using motes. In *Evolvable Hardware, 2005. Proceedings. 2005 NASA/DoD Conference on*, pages 117 – 124, 2005.

[192] S.L. Ho, Shiyou Yang, Guangzheng Ni, and H.C. Wong. A particle swarm optimization method with enhanced global search ability for design optimizations of electromagnetic devices. *IEEE Transactions on Magnetics*, 42:1107 – 1110, 2006.

[193] N. Holden and A.A. Freitas. A hybrid particle swarm/ant colony algorithm for the classification of hierarchical biological data. In *Proceedings 2005 IEEE Swarm Intelligence Symposium, 2005. SIS 2005.*, pages 100 – 107, 2005.

[194] Ge Hongwei and Liang Yanchun. Identification for non-linear systems based on particle swarm optimization and recurrent neural network [ultrasonic motor control applications]. In *Communications, Circuits and Systems, 2005. Proceedings. 2005 International Conference on*, 2005.

[195] Pan Hongxia, Ma Qingfeng, and Wei Xiuye. Research on fault diagnosis of gearbox based on particle swarm optimization algorithm. In *2006 IEEE International Conference on Mechatronics*, pages 32 – 37, 2006.

[196] S.H. Hosseini, A.M. Kashtiban, and G. Alizadeh. Particle swarm optimization and finite-element based approach for induction heating cooker design. In *SICE-ICASE, 2006. International Joint Conference*, pages 4624 – 4627, 2006.

[197] Yanli Hou, Chunhui Zhao, and Yanping Liao. A new method of test generation for sequential circuits. In *Communications, Circuits and Systems Proceedings, 2006 International Conference on*, pages 2181 – 2185, 2006.

[198] Yanli Hou, Chunhui Zhao, Yanping Liao, and Shujin Pu. Research on method of the fault diagnosis for digital circuits. In *Systems and Control in Aerospace and Astronautics, 2006. ISSCAA 2006. 1st International Symposium on*, page 4 pp., 2006.

[199] Yun-He Hou, Li-Juan Lu, Xin-Yin Xiong, and Yao-Wu Wu. Economic dispatch of power systems based on the modified particle swarm optimization algorithm. In *Transmission and Distribution Conference and Exhibition: Asia and Pacific, 2005 IEEE/PES*, pages 1 – 6, 2005.

[200] Ying-Tung Hsiao, Cheng-Long Chuang, and Joe-Air Jiang. A hybrid of /spl epsiv/-constraint and particle swarm optimization for designing of pid controllers. In *2005 IEEE International Conference on Systems, Man and Cybernetics*, pages 3063 – 3070 Vol. 4, 2005.

[201] Sheng-Ta Hsieh, Cheng-Wei Lin, and Tsung-Ying Sun. Particle swarm optimization for macrocell overlap removal and placement. In *Proceedings 2005 IEEE Swarm Intelligence Symposium, 2005. SIS 2005.*, pages 177 – 180, 2005.

[202] Haibing Hu, Qingbo Hu, Zhengyu Lu, and Dehong Xu. Optimal pid controller design in pmsm servo system via particle swarm optimization. In *Industrial Electronics Society, 2005. IECON 2005. 32nd Annual Conference of IEEE*, page 5 pp., 2005.

[203] Jianming Hu, Jingyan Song, Xiaojing Kang, and Mingchen Zhang. A study of particle swarm optimization in urban traffic surveillance system. In *Computational Engineering in Systems Applications, IMACS Multiconference on*, pages 2056 – 2061, 2006.

[204] Xiaohui Hu, R.C. Eberhart, and Yuhui Shi. Swarm intelligence for permutation optimization: a case study of n-queens problem. In *the 2003 IEEE Swarm Intelligence Symposium, 2003. SIS '03. Proceedings of*, pages 243 – 246, 2003.

[205] Chang hua Zhang, Rong fu Sun, Chong xu Liu, Yue Fan, Shuan bao Niu, and Yong hua Song. An improved particle swarm optimization and its application to power system transfer capability calculation. In *Power System Technology, 2006. PowerCon 2006. International Conference on*, pages 1 – 5, 2006.

[206] C.-M. Huang and F.-L. Wang. An rbf network with ols and epso algorithms for real-time power dispatch. *IEEE Transactions on Power Systems*, 22:96 – 104, 2007.

[207] Chao-Ming Huang, Chi-Jen Huang, and Ming-Li Wang. A particle swarm optimization to identifying the armax model for short-term load forecasting. *IEEE Transactions on Power Systems*, 20:1126 – 1133, 2005.

[208] Chenn-Jung Huang, Liang-Chun Chen, Yao-Chuan Lin, Yi-Ta Chuang, Wei Kuang Lai, and Sheng-Yu Hsiao. A zone routing protocol for bluetooth manet with online adaptive zone radius. In *Information, Communications and Signal Processing, 2005 Fifth International Conference on*, pages 579 – 583, 2005.

[209] Chenn-Jung Huang, Yi-Ta Chuang, Liang-Chun Chen, Wei Kuang Lai, and Yu-Hang Sun. Adaptive resource reservation schemes for multimedia handoffs in fourth-generation mobile communications system. In *Information, Communications and Signal Processing, 2005 Fifth International Conference on*, pages 664 – 668, 2005.

[210] Panfeng Huang and Yangsheng Xu. Pso-based time-optimal trajectory planning for space robot with dynamic constraints. In *2006. ROBIO '06. IEEE International Conference on Robotics and Biomimetics*, pages 1402 – 1407, 2006.

[211] T. Huang and A.S. Mohan. Application of particle swarm optimization for microwave imaging of lossy dielectric objects. In *Antennas and Propagation Society International Symposium, 2005 IEEE*, pages 852 – 855 vol. 1B, 2005.

[212] T. Huang and A.S. Mohan. Significance of neighborhood topologies for the reconstruction of microwave images using particle swarm optimization. In *Microwave Conference Proceedings, 2005. APMC 2005. Asia-Pacific Conference Proceedings*, page 4 pp., 2005.

[213] Tony Huang and Ananda Sanagavarapu Mohan. A microparticle swarm optimizer for the reconstruction of microwave images. *IEEE Transactions on Antennas and Propagation*, 55, 2007.

[214] Wan-Ping Huang, Li-Fang Zhou, and Ji-Xin Qian. Fir filter design: frequency sampling filters by particle swarm optimization algorithm. In *Machine Learning and Cybernetics, 2004. Proceedings of 2004 International Conference on*, pages 2322 – 2327 vol.4, 2004.

[215] Yan-Xin Huang, Yan Wang, Chun-Guang Zhou, Shu-Xue Zou, Xiao-Wei Yang, and Yan-Chun Liang. Reduction and optimization for a support-vector-machine-based fuzzy-classification-system. In *Machine Learning and Cybernetics, 2004. Proceedings of 2004 International Conference on*, pages 3402 – 3407 vol.6, 2004.

[216] Byung hwa Lee, Sang un Kim, Jin wook Seok, and Sangchul Won. Nonlinear system identification based on support vector machine using particle swarm optimization. In *SICE-ICASE, 2006. International Joint Conference*, pages 5614 – 5618, 2006.

[217] A. Ismail and A.P. Engelbrecht. Global optimization algorithms for training product unit neural networks. In *Neural Networks, 2000. IJCNN 2000, Proceedings of the IEEE-INNS-ENNS International Joint Conference on*, pages 132 – 137 vol.1, 2000.

[218] S. Ivekovic and E. Trucco. Human body pose estimation with pso. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 1256 – 1263, 2006.

[219] S. Janson and M. Middendorf. Flexible particle swarm optimization tasks for reconfigurable processor arrays. In *Parallel and Distributed Processing Symposium, 2005. Proceedings. 19th IEEE International*, page 8 pp., 2005.

[220] W. Jatmiko, Y. Ikemoto, T. Matsuno, T. Fukuda, and K. Sekiyama. Distributed odor source localization in dynamic environment. In *Sensors, 2005 IEEE*, page 4 pp., 2005.

[221] W. Jatmiko, K. Sekiyama, and T. Fukuda. A mobile robots pso-based for odor source localization in dynamic advection-diffusion environment. In *Intelligent Robots and Systems, 2006 IEEE/RSJ International Conference on*, pages 4527 – 4532, 2006.

[222] W. Jatmiko, K. Sekiyama, and T. Fukuda. A pso-based mobile sensor network for odor source localization in dynamic environment: Theory, simulation and measurement. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 1036 – 1043, 2006.

[223] Chunlin Ji, Yangyang Zhang, Shixing Gao, Ping Yuan, and Zhe Li. Particle swarm optimization for mobile ad hoc networks clustering. In *2004 IEEE International Conference on Networking, Sensing and Control*, pages 372 – 375 Vol.1, 2004.

[224] Haiyan Ji and Jinli Yuan. The application study of apple color grading by particle swarm optimization neural networks. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 2651 – 2654, 2006.

[225] Z.W. Jia, J. Liu, and X.M. Xie. Study on secondary voltage control based on multi-agent particle swarm optimization algorithm. In *Power System Technology, 2006. PowerCon 2006. International Conference on*, pages 1 – 5, 2006.

[226] Wei Jian and Yuncan Xue. Modified particle swarm optimization algorithm for steelmaking charge plan based on the pseudo tsp model. In *Industrial Electronics Society, 2005. IECON 2005. 32nd Annual Conference of IEEE*, page 5 pp., 2005.

[227] Wei Jian, Yuncan Xue, and Jiao Huang. Improved particle swarm optimization algorithm for optimum charge plan for steelmaking-continuous casting production scheduling. In *2004. IEEE ICIT '04. 2004 IEEE International Conference on Industrial Technology*, pages 1173 – 1176 Vol. 3, 2004.

[228] Mingyan Jiang, Dongfeng Yuan, Zheng Jiang, and Miaomiao Wei. Determination of wavelet denoising threshold by pso and ga. In *Microwave, Antenna, Propagation and EMC Technologies for Wireless Communications, 2005. MAPE 2005. IEEE International Symposium on*, pages 1426 – 1429 Vol. 2, 2005.

[229] Yi Jiang, Jinyuan You, and Xiaojian He. A particle swarm based network hosts clustering algorithm for peer-to-peer networks. In *Computational Intelligence and Security, 2006 International Conference on*, pages 1176 – 1179, 2006.

[230] J.J. Jimenez-Nunez and J.R. Cedeno-Maldonado. A particle swarm optimization approach for reactive power dispatch. In *Power Symposium, 2005. Proceedings of the 37th Annual North American*, pages 198 – 205, 2005.

[231] N. Jin and Y. Rahmat-Samii. Parallel particle swarm optimization and finite- difference time-domain (pso/fdtd) algorithm for multiband and wide-band patch antenna designs. *IEEE Transactions on Antennas and Propagation*, 53:3459 – 3468, 2005.

[232] Nanbo Jin and Y. Rahmat-Samii. Design of e-shaped dual-band and wideband patch antennas using parallel pso/fdtd algorithm. In *Antennas and Propagation Society International Symposium, 2005 IEEE*, pages 37 – 40 vol. 2A, 2005.

[233] Nanbo Jin and Y. Rahmat-Samii. Parallel pso/fdtd algorithm for the optimization of patch antennas and ebg structures. In *Wireless Communications and Applied Computational Electromagnetics, 2005. IEEE/ACES International Conference on*, pages 582 – 585, 2005.

[234] Nanbo Jin and Yahya Rahmat-Samii. Advances in particle swarm optimization for antenna designs: Real-number, binary, single-objective and multiobjective implementations. *IEEE Transactions on Antennas and Propagation*, 55, 2007.

[235] Nanbo Jin and Y. RahmatSamii. Real-number and binary multi-objective particle swarm optimizations: Aperiodic antenna array designs. In *Antennas and Propagation Society International Symposium 2006, IEEE*, pages 3523 – 3526, 2006.

[236] Xiaoling Jin, Jianguo Zhao, Ying Sun, Kejun Li, and Boqin Zhang. Distribution network reconfiguration for load balancing using binary particle swarm optimization. In *Power System Technology, 2004. PowerCon 2004. 2004 International Conference on*, pages 507 – 510 Vol.1, 2004.

[237] Yi-Xiong Jin, Hao-Zhong Cheng, Jian-Yong Yan, and Li Zhang. Local optimum embranchment based convergence guarantee particle swarm optimization and its application in transmission network planning. In *Transmission and Distribution Conference and Exhibition: Asia and Pacific, 2005 IEEE/PES*, pages 1 – 6, 2005.

[238] C.-F. Juang and C.-F. Lu. Load-frequency control by hybrid evolutionary fuzzy pi controller. In *Generation, Transmission and Distribution, IEE Proceedings-*, pages 196 – 204, 2006.

[239] Chia-Feng Juang. A hybrid of genetic algorithm and particle swarm optimization for recurrent network design. *IEEE Transactions on Systems, Man and Cybernetics, Part B*, 34:997 – 1006, 2004.

[240] Chia-Feng Juang and Chao-Hsin Hsu. Temperature control by chip-implemented adaptive recurrent fuzzy controller designed by evolutionary algorithm. *IEEE Transactions on [see also Circuits and Systems I: Fundamental Theory and Applications, IEEE Transactions on] Circuits and Systems I: Regular Papers*, 52:2376 – 2384, 2005.

[241] Chia-Feng Juang and Yuan-Chang Liou. On the hybrid of genetic algorithm and particle swarm optimization for evolving recurrent neural network. In *Neural Networks, 2004. Proceedings. 2004 IEEE International Joint Conference on*, pages 2285 – 2289 vol.3, 2004.

[242] Chia-Feng Juang and Yuan-Chang Liou. Tsk-type recurrent fuzzy network design by the hybrid of genetic algorithm and particle swarm optimization. In *2004 IEEE International Conference on Systems, Man and Cybernetics*, pages 2314 – 2318 vol.3, 2004.

[243] Chia-Feng Juang and Chun-Feng Lu. Power system load frequency control by evolutionary fuzzy pi controller. In *2004. Proceedings. 2004 IEEE International Conference on Fuzzy Systems*, pages 715 – 719 vol.2, 2004.

[244] Jih-Gau Juang, Bo-Shian Lin, and Kuo-Chih Chin. Automatic landing control using particle swarm optimization. In *2005. ICM '05. IEEE International Conference on Mechatronics*, pages 721 – 726, 2005.

[245] Zou Jun, Fu Xin, Yang Huayong, and Zhang Jianmin. A particle swarm optimization approach for pid parameters in hydraulic servo control system. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 7725 – 7729, 2006.

[246] Sun Kai and Yang Genke. An effective hybrid optimization algorithm for the flow shop scheduling problem. In *2006 IEEE International Conference on Information Acquisition*, pages 1234 – 1238, 2006.

[247] A. Kalos. Modeling midi music as multivariate time series. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 2058 – 2064, 2006.

[248] K. Kameyama, N. Oka, and K. Toraichi. Optimal parameter selection in image similarity evaluation algorithms using particle swarm optimization. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 1079 – 1086, 2006.

[249] S. Kannan, S.M.R. Slochanal, and N.P. Padhy. Application and comparison of metaheuristic techniques to generation expansion planning problem. *IEEE Transactions on Power Systems*, 20:466 – 475, 2005.

[250] A. Karimi, A. Al-Hinai, K. Schoder, and A. Feliachi. Power system stability enhancement using backstepping controller tuned by particle swarm optimization technique. In *Power Engineering Society General Meeting, 2005. IEEE*, pages 1388 – 1395 Vol. 2, 2005.

[251] A. Karimi and A. Feliachi. Decentralized extended-backstepping control of power systems. In *Power Engineering Society General Meeting, 2006. IEEE*, page 8 pp., 2006.

[252] I.N. Kassabalidis, M.A. El-Sharkawi, II Marks , R.J., L.S. Moulin, and A.P. Alves da Silva. Dynamic security border identification using enhanced particle swarm optimization. *IEEE Transactions on Power Systems*, 17:723 – 729, 2002.

[253] D. Kavitha and K.S. Swarup. Transmission expansion planning using lp-based particle swarm optimization. In *Power India Conference, 2006 IEEE*, page 6 pp., 2006.

[254] Jing Ke, Yizheng Qiao, and Jixin Qian. Identification of time-varying delay systems using particle swarm optimization. In *Intelligent Control and Automation, 2004. WCICA 2004. Fifth World Congress on*, pages 330 – 334 Vol.1, 2004.

[255] N. Khemka, C. Jacob, and G. Cole. Making soccer kicks better: a study in particle swarm optimization and evolution strategies. In *IEEE Congress on Evolutionary Computation, 2005. The 2005*, pages 735 – 742 Vol.1, 2005.

[256] M. Khodier and N. Dib. Design of multi-band transmission line transformer using particle swarm optimization. In *Antennas and Propagation Society International Symposium 2006, IEEE*, pages 3305 – 3308, 2006.

[257] M.M. Khodier and C.G. Christodoulou. Linear array geometry synthesis with minimum sidelobe level and null control using particle swarm optimization. *IEEE Transactions on Antennas and Propagation*, 53, 2005.

[258] A. Khosla, S. Kumar, and K.K. Aggarwal. A framework for identification of fuzzy models through particle swarm optimization algorithm. In *INDICON, 2005 Annual IEEE*, pages 388 – 391, 2005.

[259] Youngwook Kim, Sean Keely, Joydeep Ghosh, and Hao Ling. Application of artificial neural networks to broadband antenna design based on a parametric frequency model. *IEEE Transactions on Antennas and Propagation*, 55, 2007.

[260] Youngwook Kim and Hao Ling. Equivalent circuit modeling of broadband antennas using vector fitting and particle swarm optimization. In *Antennas and Propagation Society International Symposium 2006, IEEE*, pages 3555 – 3558, 2006.

28

[261] S. Kitagawa and Y. Fukuyama. Comparison of particle swarm optimizations for optimal operational planning of energy plants. In *Proceedings 2005 IEEE Swarm Intelligence Symposium, 2005. SIS 2005.*, pages 155 – 161, 2005.

[262] E.T. Ko, S.K. Hwang, and J.S. Lee. A combustion control modeling of coke oven by swarm-based fuzzy system. In *SICE-ICASE, 2006. International Joint Conference*, pages 2503 – 2507, 2006.

[263] Chin Aik Koay and D. Srinivasan. Particle swarm optimization-based approach for generator maintenance scheduling. In *the 2003 IEEE Swarm Intelligence Symposium, 2003. SIS '03. Proceedings of*, pages 167 – 173, 2003.

[264] G. Kokai, T. Christ, and H.H. Frhauf. Using hardware-based particle swarm method for dynamic optimization of adaptive array antennas. In *Adaptive Hardware and Systems, 2006. AHS 2006. First NASA/ESA Conference on*, pages 51 – 58, 2006.

[265] Xiaohong Kong, Jun Sun, and Wenbo Xu. Particle swarm algorithm for tasks scheduling in distributed heterogeneous system. In *Intelligent Systems Design and Applications, 2006. ISDA '06. Sixth International Conference on*, pages 690 – 695, 2006.

[266] D.J. Krusienski and W.K. Jenkins. Adaptive filtering via particle swarm optimization. In *Signals, Systems and Computers, 2003. Conference Record of the Thirty-Seventh Asilomar Conference on*, pages 571 – 575 Vol.1, 2003.

[267] D.J. Krusienski and W.K. Jenkins. The application of particle swarm optimization to adaptive iir phase equalization. In *2004. Proceedings. (ICASSP '04). IEEE International Conference on Acoustics, Speech, and Signal Processing*, pages ii – 693–6 vol.2, 2004.

[268] D.J. Krusienski and W.K. Jenkins. Particle swarm optimization for adaptive iir filter structures. In *Evolutionary Computation, 2004. CEC2004. Congress on*, pages 965 – 970 Vol.1, 2004.

[269] D.J. Krusienski and W.K. Jenkins. A particle swarm optimization-least mean squares algorithm for adaptive filtering. In *Signals, Systems and Computers, 2004. Conference Record of the Thirty-Eighth Asilomar Conference on*, pages 241 – 245 Vol.1, 2004.

[270] D.J. Krusienski and W.K. Jenkins. A modified particle swarm optimization algorithm for adaptive filtering. In *Circuits and Systems, 2006. ISCAS 2006. Proceedings. 2006 IEEE International Symposium on*, page 4 pp., 2006.

[271] A.I.S. Kumar, K. Dhanushkodi, J.J. Kumar, and C.K.C. Paul. Particle swarm optimization solution to emission and economic dispatch problem. In *TENCON 2003. Conference on Convergent Technologies for Asia-Pacific Region*, pages 435 – 439 Vol.1, 2003.

[272] V. Kumar and E. Cole. An ant colony optimization model for wireless ad-hoc network autoconfiguration. In *2005 IEEE International Conference on Systems, Man and Cybernetics*, pages 103 – 108 Vol. 1, 2005.

[273] W. Kurutach and Y. Tuppadung. Feeder-switch relocation based upon risk analysis of trees-caused interruption and value-based distribution reliability assessment. In *TENCON 2004. 2004 IEEE Region 10 Conference*, pages 577 – 580 Vol. 3, 2004.

[274] N.M. Kwok, Q.P. Ha, D.K. Liu, and G. Fang. Intensity-preserving contrast enhancement for gray-level images using multi-objective particle swarm optimization. In *2006. CASE '06. IEEE International Conference on Automation Science and Engineering*, pages 21 – 26, 2006.

[275] Lizzi L., Viani F., Azaro R., and Massa A. Optimization of a spline-shaped uwb antenna by pso. In *IEEE Antennas and Wireless Propagation Letters : Accepted for future publication*, pages 1 – 1, 2007.

[276] L.L. Lai, T.Y. Nieh, D. Vujatovic, Y.N. Ma, Y.P. Lu, Y.W. Wang, and H. Braun. Particle swarm optimization for economic dispatch of units with non-smooth input-output characteristic functions. In *Intelligent Systems Application to Power Systems, 2005. Proceedings of the 13th International Conference on*, page 5 pp., 2005.

[277] W.B. Langdon and R. Poll. Evolutionary solo pong players. In *IEEE Congress on Evolutionary Computation, 2005. The 2005*, pages 2621 – 2628 Vol. 3, 2005.

[278] E.C. Laskari, G.C. Meletiou, and M.N. Vrahatis. Utilizing evolutionary computation methods for the design of s-boxes. In *Computational Intelligence and Security, 2006 International Conference on*, pages 1299 – 1302, 2006.

[279] Jong Kwang Lee, Hyo Jik Lee, Byung Suk Park, and Ji Sup Yoon. Parameter identification for position-based robot hand tracking. In *SICE-ICASE, 2006. International Joint Conference*, pages 3063 – 3067, 2006.

[280] K.Y. Lee. Intelligent techniques applied to power plant. In *Power Engineering Society General Meeting, 2006. IEEE*, page 8 pp., 2006.

[281] K.Y. Lee and Jong-Bae Park. Application of particle swarm optimization to economic dispatch problem: Advantages and disadvantages. In *Power Systems Conference and Exposition, 2006. PSCE '06. 2006 IEEE PES*, pages 188 – 192, 2006.

[282] Tsair-Fwu Lee, Ming-Yuan Cho, Chin-Shiuh Shieh, and Fu-Min Fang. Particle swarm optimization-based svm application: Power transformers incipient fault syndrome diagnosis. In *Hybrid Information Technology, 2006. ICHIT '06. Vol1. International Conference on*, pages 468 – 472, 2006.

[283] J. Lei, Y. Yamada, and Y. Komura. Layout optimization of manufacturing cells using particle swarm optimization. In *SICE 2003 Annual Conference*, pages 392 – 396 Vol.1, 2003.

[284] Kaiyou Lei, Yuhui Qiu, and Yi He. A novel path planning for mobile robots using modified particle swarm optimizer. In *Systems and Control in Aerospace and Astronautics, 2006. ISSCAA 2006. 1st International Symposium on*, page 4 pp., 2006.

[285] Keping Leng, Ping Ren, and Liqun Gao. A novel approach to integrated preventive maintenance planning and production scheduling for a single machine using the chaotic particle swarm optimization algorithm. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 7816 – 7820, 2006.

[286] D. Li, Liqun Gao, Junzheng Zhang, and Yang Li. Power system reactive power optimization based on adaptive particle swarm optimization algorithm. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 7572 – 7576, 2006.

[287] Jian-Ming Li, Zhong-Xian Chi, Li-Qiang Yu, Feng Zhang, and Qiao-Qiao Jiang. The maximum variance between clusters method of image segmentation based on particle swarm optimization. In *Machine Learning and Cybernetics, 2006 International Conference on*, pages 3765 – 3769, 2006.

[288] Lijuan Li, Zhibin Huang, and Feng Liu. An improved particle swarm optimizer for truss structure optimization. In *Computational Intelligence and Security, 2006 International Conference on*, pages 924 – 928, 2006.

[289] Shibo Li, Xiuxia Sun, and Yuejian Xu. Particle swarm optimization for route planning of un- manned aerial vehicles. In *2006 IEEE International Conference on Information Acquisition*, pages 1213 – 1218, 2006.

[290] Xiang Li, Shang-Dong Yang, Jian-Xun Qi, and Shu-Xia Yang. Short-term electric load forecasting based on sapso-ann algorithm. In *Machine Learning and Cybernetics, 2006 International Conference on*, pages 2882 – 2885, 2006.

[291] Yangmin Li and Xin Chen. Leader-formation navigation with sensor constraints. In *2005 IEEE International Conference on Information Acquisition*, page 6 pp., 2005.

[292] Yongjie Li, Dezhong Yao, and Wufan Chen. Adaptive particle swarm optimizer for beam an- gle selection in radiotherapy planning. In *2005 IEEE International Conference Mechatronics and Automation*, pages 421 – 425 Vol. 1, 2005.

[293] Yuelong Li, Jinping Li, and Li Meng. Character recognition based on hierarchical rbf neural networks. In *Intelligent Systems Design and Applications, 2006. ISDA '06. Sixth Interna- tional Conference on*, pages 127 – 132, 2006.

[294] Zhigang Lian, Xingsheng Gu, and Bin Jiao. A dual similar particle swarm optimization algorithm for job-shop scheduling with penalty. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 7312 – 7316, 2006.

[295] J.J. Liang, P.N. Suganthan, C.C. Chan, and V.L. Huang. Wavelength detection in fbg sensor network using tree search dms-pso. In *Photonics Technology Letters, IEEE*, pages 1305 – 1307, 2006.

[296] Cheng-Jian Lin, Shang-Jin Hong, and Chi-Yung Lee. The design of neuro-fuzzy networks using particle swarm optimization and recursive singular value decomposition. In *Neural Networks, 2006. IJCNN '06. International Joint Conference on*, pages 2887 – 2893, 2006.

[297] Cheng-Jian Lin, Tzu-Chao Lin, and Chin-Ling Lee. An asymmetry subsethood-based neural fuzzy network. In *Neural Networks, 2006. IJCNN '06. International Joint Conference on*, pages 2852 – 2858, 2006.

[298] Chun-Ling Lin, Sheng-Ta Hsieh, Tsung-Ying Sun, and Chan-Cheng Liu. Cluster distance factor searching by particle swarm optimization for self-growing radial basis function neural network. In *Neural Networks, 2006. IJCNN '06. International Joint Conference on*, pages 4825 – 4830, 2006.

[299] Chun-Ling Lin, Sheng-Ta Hsieh, tsung Ying Sun, and Chan-Cheng Liu. Pso-based learning rate adjustment for blind source separation. In *Intelligent Signal Processing and Commu- nication Systems, 2005. ISPACS 2005. Proceedings of 2005 International Symposium on*, pages 181 – 184, 2005.

[300] Jiann-Horng Lin. Particle swarm optimization for control of nonlinear dynamics. In *Innova- tive Computing, Information and Control, 2006. ICICIC '06. First International Conference on*, pages 542 – 545, 2006.

[301] Jiann-Horng Lin and Ting-Yu Cheng. Dynamic clustering using support vector learning with particle swarm optimization. In *Systems Engineering, 2005. ICSEng 2005. 18th International Conference on*, pages 218 – 223, 2005.

[302] Weixing Lin, HuidiZhang, and P.X. Liu. A new identification method for hammerstein model based on pso. In *Proceedings of the 2006 IEEE International Conference on Mechatronics and Automation*, pages 2184 – 2188, 2006.

31

[303] Ai ling Chen, Mu lan Wang, and Kun Liu. Prediction of the flow stress for 30 mnsi steel using evolutionary least squares support vector machine and mathematical models. In *2005. ICIT 2005. IEEE International Conference on Industrial Technology*, pages 963 – 968, 2005.

[304] Baozheng Liu, Ping Ren, Liqun Gao, and Nan Li. A new combinatorial meta-heuristic algorithm for stochastic electric power system production costing and operations planning. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 7429 – 7433, 2006.

[305] Bo Liu, Ling Wang, and Yi-Hui Jin. An effective pso-based memetic algorithm for flow shop scheduling. *IEEE Transactions on Systems, Man and Cybernetics, Part B*, 37:18 – 27, 2007.

[306] Bo-Fu Liu, Hung-Ming Chen, Hui-Ling Huang, Shiow-Fen Hwang, and Shinn-Ying Ho. Flexible protein-ligand docking using particle swarm optimization. In *IEEE Congress on Evolutionary Computation, 2005. The 2005*, pages 251 – 258 Vol.1, 2005.

[307] D.S. Liu, K.C. Tan, C.K. Goh, and W.K. Ho. On solving multiobjective bin packing problems using particle swarm optimization. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 2095 – 2102, 2006.

[308] Fang Liu, Jian-Zhong Zhou, Reng-Cun Fang, Bin Peng, and Jun-Jie Yang. An improved particle swarm optimization and its application in long-term streamflow forecast. In *Machine Learning and Cybernetics, 2005. Proceedings of 2005 International Conference on*, pages 2913 – 2918 Vol. 5, 2005.

[309] Hong-Bo Liu, Yi-Yuan Tang, Jun Meng, and Ye Ji. Neural networks learning using vbest model particle swarm optimisation. In *Proceedings of 2004 International Conference on Machine Learning and Cybernetics, 2004.*, pages 3157 – 3159 vol.5, 2004.

[310] Hongbo Liu, Shichang Sun, and A. Abraham. Particle swarm approach to scheduling work-flow applications in distributed data-intensive computing environments. In *Intelligent Systems Design and Applications, 2006. ISDA '06. Sixth International Conference on*, pages 661 – 666, 2006.

[311] J. Liu, Wenbo Xu, and J. Sun. Nonlinear system identification of hammerstien and wiener model using swarm intelligence. In *2006 IEEE International Conference on Information Acquisition*, pages 1219 – 1223, 2006.

[312] Jia Liu, Hongtao Yu, Yadong Gong, and Wanshan Wang. Application of improved pso for csi in customization system oriented network manufacturing. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 7944 – 7947, 2006.

[313] Jianchang Liu and Yingying Chen. The application of neural network based on particle swarm optimization in pattern recognition of flatness signal. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 6592 – 6595, 2006.

[314] Li Liu and D.A. Cartes. A particle swarm optimization approach for automatic diagnosis of pmsm stator fault. In *American Control Conference, 2006*, page 6 pp., 2006.

[315] Te-Chen Liu and Ji-Chang Wang. A discrete particle swarm optimizer for graphic presentation of gmdh network. In *2005 IEEE International Conference on Systems, Man and Cybernetics*, pages 2329 – 2333 Vol. 3, 2005.

[316] Wei Liu, KejunWang, and Mo Tang. Study on power system load forecasting based on mpso artificial neural networks. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 2728 – 2732, 2006.

32

[317] Wei Liu and Ming Liang. A particle swarm optimization approach to a multi-objective reconfigurable machine tool design problem. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 2222 – 2229, 2006.

[318] Wei Liu, Kejun Wang, Bing Sun, and Keyong Shao. A hybrid particle swarm optimization algorithm for predicting the chaotic time series. In *Proceedings of the 2006 IEEE International Conference on Mechatronics and Automation*, pages 2454 – 2458, 2006.

[319] Wen-Chung Liu. Design of a multiband cpw-fed monopole antenna using a particle swarm optimization approach. *IEEE Transactions on Antennas and Propagation*, 53:3273 – 3279, 2005.

[320] Wenxin Liu, D.A. Cartes, and G.K. Venayagamoorthy. Particle swarm optimization based defensive islanding of large scale power system. In *Neural Networks, 2006. IJCNN '06. International Joint Conference on*, pages 1719 – 1725, 2006.

[321] Xiyu Liu and Hong Liu. A new clarans algorithm based on particle swarm optimization. In *2006. CIT '06. The Sixth IEEE International Conference on Computer and Information Technology*, pages 12 – 12, 2006.

[322] Xiyu Liu, Hong Liu, and Huichuan Duan. Particle swarm optimization based on dynamic niche technology with applications to conceptual design. In *Computer Supported Cooperative Work in Design, 10th International Conference on*, pages 1 – 6, 2006.

[323] Yijian Liu and Xiongxiong He. Modeling identification of power plant thermal process based on pso algorithm. In *American Control Conference, 2005. Proceedings of the 2005*, pages 4484 – 4489 vol. 7, 2005.

[324] Yijian Liu, Jianming Zhang, and Shuqing Wang. Optimization design based on pso algorithm for pid controller. In *Intelligent Control and Automation, 2004. WCICA 2004. Fifth World Congress on*, pages 2419 – 2422 Vol.3, 2004.

[325] Yijian Liu, Xuemei Zhu, Jianming Zhang, and Shuqing Wang. Application of particle swarm optimization algorithm for weighted fuzzy rule-based system. In *Industrial Electronics Society, 2004. IECON 2004. 30th Annual Conference of IEEE*, pages 2188 – 2191 Vol. 3, 2004.

[326] Yunlong Liu and H. Yokota. Modeling transcriptional regulation in chondrogenesis using particle swarm optimization. In *Computational Intelligence in Bioinformatics and Computational Biology, 2005. CIBCB '05. Proceedings of the 2005 IEEE Symposium on*, pages 1 – 7, 2005.

[327] Zhixiong Liu and Shaomei Wang. Hybrid particle swarm optimization for permutation flow shop scheduling. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 3245 – 3249, 2006.

[328] H.S. Lope and L.S. Coelho. Particle swarn optimization with fast local search for the blind traveling salesman problem. In *Hybrid Intelligent Systems, 2005. Fifth International Conference on*, pages 245 – 250, 2005.

[329] Chun-Feng Lu and Chia-Feng Juang. Control of flexible ac transmission system by evolutionary fuzzy controller. In *2004 IEEE International Conference on Systems, Man and Cybernetics*, pages 2292 – 2296 vol.3, 2004.

[330] Chun-Feng Lu and Chia-Feng Juang. Evolutionary fuzzy control of flexible ac transmission system. In *Generation, Transmission and Distribution, IEE Proceedings-*, pages 441 – 448, 2005.

[331] Zhilin Lu, Bingquan Fan, Dongli Wang, and Xiaoyang He. Neural network predictive control based on particle swarm optimization for urban expressway. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 8606 – 8611, 2006.

[332] E.H. Luna, C.A. Coello Coello, and A.H. Aguirre. On the use of a population-based particle swarm optimizer to design combinational logic circuits. In *Evolvable Hardware, 2004. Proceedings. 2004 NASA/DoD Conference on*, pages 183 – 190, 2004.

[333] Xinggang Luo, Dingwei Wang, Jiafu Tang, and Yiliu Tu. An improved pso algorithm for resource-constrained project scheduling problem. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 3514 – 3518, 2006.

[334] Hui-Ying Lv, Wen-Gang Zhou, and Chun-Guang Zhou. A discrete particle swarm optimization algorithm for phylogenetic tree reconstruction. In *Machine Learning and Cybernetics, 2004. Proceedings of 2004 International Conference on*, pages 2650 – 2654 vol.4, 2004.

[335] Yanping Lv, Shaozi Li, Changle Zhou, Wenzhong Guo, and Zhengming Xu. Two improved algorithms for multiple sequence alignment in a remote diagnose system for colonic cancer in pervasive environment. In *Pervasive Computing and Applications, 2006 1st International Symposium on*, pages 145 – 150, 2006.

[336] Benedetti M., Azaro R., Franceschini D., and Massa A. Pso-based real-time control of planar uniform circular arrays. In *IEEE Antennas and Wireless Propagation Letters : Accepted for future publication*, pages 1 – 1, 2006.

[337] Fei Ma and Xue bo Chen. Application of varying population size particle swarm optimization algorithm to agc of power systems. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 3310 – 3314, 2006.

[338] Ming MA, Chun-Guang Zhou, Li-Biao Zhang, and Quan-Sheng Dou. Automatic fuzzy rule extraction based on particle swarm optimization. In *Machine Learning and Cybernetics, 2004. Proceedings of 2004 International Conference on*, pages 2242 – 2245 vol.4, 2004.

[339] Ming Ma, Chun-Guang Zhou, Li-Biao Zhang, and Quan-Sheng Dou. Automatic generating fuzzy rules with a particle swarm optimization. In *Proceedings of 2005 International Conference on Machine Learning and Cybernetics, 2005.*, pages 5695 – 5698 Vol. 9, 2005.

[340] Ming Ma, Chun-Guang Zhou, Li-Biao Zhang, and Quan-Sheng Dou. Fuzzy rule extraction by two-objective particle swarm optimization and application for taste identification of tea. In *Machine Learning and Cybernetics, 2005. Proceedings of 2005 International Conference on*, pages 5690 – 5694 Vol. 9, 2005.

[341] Xian-Min Ma and Yan-Yun Zhao. Direct torque control mining locomotive haulage with fuzzy controller based on particle swarm optimization. In *Machine Learning and Cybernetics, 2006 International Conference on*, pages 505 – 510, 2006.

[342] Y. Ma, C. Jiang, Z. Hou, and C. Wang. The formulation of the optimal strategies for the electricity producers based on the particle swarm optimization algorithm. *IEEE Transactions on Power Systems*, 21:1663 – 1671, 2006.

[343] J. Madar, J. Abonyi, and F. Szeifert. Interactive particle swarm optimization. In *Intelligent Systems Design and Applications, 2005. ISDA '05. Proceedings. 5th International Conference on*, pages 314 – 319, 2005.

[344] A. Mahanfar, S. Bila, M. Aubourg, and S. Verdeyme. Design of planar microwave filters using a simple fdtd model and particle swarm optimization. In *Antennas and Propagation Society International Symposium, 2005 IEEE*, pages 259 – 262 vol. 2B, 2005.

[345] S. Maheswararajah and S. Halgamuge. Sensor scheduling for target tracking using particle swarm optimization. In *Vehicular Technology Conference, 2006. VTC 2006-Spring. IEEE 63rd*, pages 573 – 577, 2006.

[346] S.K. Mandal and A. De. A 20 ghz compact scalable model of silicon-based on-chip spiral inductor for rfics. In *Microwave & Telecommunication Technology, 2005 15th International Crimean Conference*, pages 543 – 546 Vol. 2, 2005.

[347] S.K. Mandal, A. De, A. Patra, and S. Sural. A wide-band lumped element compact cad model of si-based planar spiral inductor for rfic design. In *VLSI Design, 2006. Held jointly with 5th International Conference on Embedded Systems and Design., 19th International Conference on*, page 6 pp., 2006.

[348] S.K. Mandal, A. De, A. Patra, S. Sural, and T.K. Bhattacharya. Particle swarm optimization for modeling and parameter extraction of on-chip spiral inductors for rfics. In *India Annual Conference, 2004. Proceedings of the IEEE INDICON 2004. First*, pages 17 – 22, 2004.

[349] A.H. Mantawy and M.S. Al-Ghamdi. A new reactive power optimization algorithm. In *Power Tech Conference Proceedings, 2003 IEEE Bologna*, page 6 pp. Vol.4, 2003.

[350] A. Marandi, F. Afshinmanesh, M. Shahabadi, and F. Bahrami. Boolean particle swarm optimization and its application to the design of a dual-band dual-polarized planar antenna. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 3212 – 3218, 2006.

[351] R. Marinke, E. Araujo, Ld.S. Coelho, and I. Matiko. Particle swarm optimization (pso) applied to fuzzy modeling in a thermal-vacuum system. In *Hybrid Intelligent Systems, 2005. Fifth International Conference on*, page 6 pp., 2005.

[352] A. Massarini, U. Reggiani, and L. Sandrolini. Multifrequency optimization of multilayered shields. In *Electromagnetic Compatibility, 2002 IEEE International Symposium on*, pages 134 – 139 vol.1, 2002.

[353] L. Matekovits, M. Mussetta, P. Pirinoli, S. Selleri, and R.E. Zich. Particle swarm optimization of microwave microstrip filters. In *Antennas and Propagation Society International Symposium, 2004. IEEE*, pages 2731 – 2734 Vol.3, 2004.

[354] L. Matekovits, M. Mussetta, P. Pirinoli, S. Selleri, and R.E. Zich. Improved pso algorithms for electromagnetic optimization. In *Antennas and Propagation Society International Symposium, 2005 IEEE*, pages 33 – 36 vol. 2A, 2005.

[355] Y. Matsui. Speed control of three-inertia systems by full-order controllers. In *SICE-ICASE, 2006. International Joint Conference*, pages 4366 – 4369, 2006.

[356] T. Meena and K. Selvi. Cluster based congestion management in deregulated electricity market using pso. In *INDICON, 2005 Annual IEEE*, pages 627 – 630, 2005.

[357] R. Mehran, A. Fatehi, C. Lucas, and B.N. Araabi. Particle swarm extension to lolimot. In *Intelligent Systems Design and Applications, 2006. ISDA '06. Sixth International Conference on*, pages 969 – 974, 2006.

[358] Tang Meiqin, Wang Haiqiang, Long Chengnian, and Guan Xinping. Simple rate control algorithm in tcp network using pso. In *Chinese Control Conference, 2006*, pages 1811 – 1814, 2006.

[359] S.F. Mekhamer, Y.G. Moustafa, N. EI-Sherif, and M.M. Mansour. A modified particle swarm optimizer applied to the solution of the economic dispatch problem. In *Electrical, Electronic and Computer Engineering, 2004. ICEEC '04. 2004 International Conference on*, pages 725 – 731, 2004.

[360] R. Mendes, P. Cortez, M. Rocha, and J. Neves. Particle swarms for feedforward neural network training. In *Neural Networks, 2002. IJCNN '02. Proceedings of the 2002 International Joint Conference on*, pages 1895 – 1899, 2002.

[361] C. Mendis, S.M. Guru, S. Halgamuge, and S. Fernando. Optimized sink node path using particle swarm optimization. In *Advanced Information Networking and Applications, 2006. AINA 2006. 20th International Conference on*, page 5 pp., 2006.

[362] Yu Meng, Yan Zhang, Wenhui Li, and Yunjie Pang. Image analogy using patch-based texture synthesis. In *Communications, Circuits and Systems, 2004. ICCCAS 2004. 2004 International Conference on*, pages 974 – 978 Vol.2, 2004.

[363] L. Messerschmidt and A.P. Engelbrecht. Learning to play games using a pso-based competitive learning approach. *IEEE Transactions on Evolutionary Computation*, 8:280 – 288, 2004.

[364] M.D. Migliore, D. Pinchera, and F. Schettino. A simple and robust adaptive parasitic antenna. *IEEE Transactions on Antennas and Propagation*, 53:3262 – 3272, 2005.

[365] E. Miguelanez, A.M.S. Zalzala, and P. Buxton. Swarm intelligence in automated electrical wafer sort classification. In *IEEE Congress on Evolutionary Computation, 2005. The 2005*, pages 1597 – 1604 Vol. 2, 2005.

[366] E. Miguelanez, A.M.S. Zalzala, and P. Tabor. Evolving neural networks using swarm intelligence for binmap classification. In *Evolutionary Computation, 2004. CEC2004. Congress on*, pages 978 – 985 Vol.1, 2004.

[367] S. Mikki and A.A. Kishk. Investigation of the quantum particle swarm optimization technique for electromagnetic applications. In *Antennas and Propagation Society International Symposium, 2005 IEEE*, pages 45 – 48 vol. 2A, 2005.

[368] S.M. Mikki and A.A. Kishk. Quantum particle swarm optimization for electromagnetics. *IEEE Transactions on Antennas and Propagation*, 54:2764 – 2775, 2006.

[369] M.E. Mims and D.F. Kelley. Application of particle swarm optimization to the design of multi-band antennas with lumped loads. In *Antennas and Propagation Society International Symposium 2006, IEEE*, pages 3547 – 3550, 2006.

[370] Hua-Qing Min, Jin-Hui Zhu, and Xi-Jing Zheng. Obstacle avoidance with multi-objective optimization by pso in dynamic environment. In *Machine Learning and Cybernetics, 2005. Proceedings of 2005 International Conference on*, pages 2950 – 2956 Vol. 5, 2005.

[371] B.B. Misra, S.C. Satapathy, and P.K. Dash. Particle swarm optimized polynomials for data classification. In *Intelligent Systems Design and Applications, 2006. ISDA '06. Sixth International Conference on*, pages 649 – 654, 2006.

[372] S. Mohaghegi, Y. del Valle, G.K. Venayagamoorthy, and R.G. Harley. A comparison of pso and backpropagation for training rbf neural networks for identification of a power system with statcom. In *Proceedings 2005 IEEE Swarm Intelligence Symposium, 2005. SIS 2005.*, pages 381 – 384, 2005.

[373] A.W. Mohemmed and N. Kamel. Particle swarm optimization for bluetooth scatternet formation. In *Mobile Technology, Applications and Systems, 2005 2nd International Conference on*, page 5 pp., 2005.

[374] R. Montemanni and L.M. Gambardella. Swarm approach for a connectivity problem in wireless networks. In *Proceedings 2005 IEEE Swarm Intelligence Symposium, 2005. SIS 2005.*, pages 265 – 272, 2005.

[375] P. Moore and G.K. Venayagamoorthy. Evolving combinational logic circuits using a hybrid quantum evolution and particle swarm inspired algorithm. In *Evolvable Hardware, 2005. Proceedings. 2005 NASA/DoD Conference on*, pages 97 – 102, 2005.

[376] V. Mukherjee and S.P. Ghoshal. Velocity relaxed swarm intelligent tuning of fuzzy based power system stabilizer. In *Power India Conference, 2006 IEEE*, page 8 pp., 2006.

[377] A. Naitali and F. Giri. Hammerstein and wiener nonlinear models identification using a multimodal particle swarm optimizer. In *American Control Conference, 2006*, page 6 pp., 2006.

[378] M. Neethling and A.P. Engelbrecht. Determining rna secondary structure using set-based particle swarm optimization. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 1670 – 1677, 2006.

[379] J.K. Nelson, M.U. Hazen, and M.R. Gupta. Global optimization for multiple transmitter localization. In *MILCOM 2006*, pages 1 – 7, 2006.

[380] J. Nenortaite and R. Simutis. Adapting particle swarm optimization to stock markets. In *Intelligent Systems Design and Applications, 2005. ISDA '05. Proceedings. 5th International Conference on*, pages 520 – 525, 2005.

[381] P.N. Ngatchou, W.L.J. Fox, and M.A. El-Sharkawi. Distributed sensor placement with sequential particle swarm optimization. In *Proceedings 2005 IEEE Swarm Intelligence Symposium, 2005. SIS 2005.*, pages 385 – 388, 2005.

[382] P.N. Ngatchou, W.L.J. Fox, and M.A. El-Sharkawi. Multiobjective multistatic sonar sensor placement. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 2713 – 2719, 2006.

[383] T. Niknam, A.M. Ranjbar, A.R. Shirani, B. Mozafari, and A. Ostadi. Optimal operation of distribution system with regard to distributed generation: a comparison of evolutionary methods. In *Industry Applications Conference, 2005. Fourtieth IAS Annual Meeting. Conference Record of the 2005*, pages 2690 – 2697 Vol. 4, 2005.

[384] I. Nilkhamhang and A. Sano. Particle swarm optimization for identification of gms friction model. In *SICE-ICASE, 2006. International Joint Conference*, pages 5628 – 5633, 2006.

[385] Li Ning, Liu Fei, Sun Debao, and Huang Chang. Particle swarm optimization for constrained layout optimization. In *Intelligent Control and Automation, 2004. WCICA 2004. Fifth World Congress on*, pages 2214 – 2218 Vol.3, 2004.

[386] Dong-Xiao Niu, Yun-Peng Ling, Qi Zhao, and Qing-Ying Zhao. An improved particle swarm optimization method based on borderline search strategy for transmission network expansion planning. In *Machine Learning and Cybernetics, 2006 International Conference on*, pages 2846 – 2850, 2006.

[387] Dongxiao Niu, Bo Zhang, Ming Meng, and Gong Cheng. Grey model of power load forecasting based on particle swarm optimization. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 7651 – 7655, 2006.

[388] Yifeng Niu and Lincheng Shen. A novel approach to image fusion based on multi-objective optimization. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 9911 – 9915, 2006.

[389] M.M. Noel, P.P. Joshi, and T.C. Jannett. Improved maximum likelihood estimation of target position in wireless sensor networks using particle swarm optimization. In *Information Technology: New Generations, 2006. ITNG 2006. Third International Conference on*, pages 274 – 279, 2006.

[390] M. Noura and M. Batouche. Ima e enhancement sin redator- rey ptimi er al orithm. In *Information and Communication Technologies, 2006. ICTTA '06. 2nd*, pages 1584 – 1589, 2006.

[391] C.N. Nyirenda and D.S. Dawoud. Multi-objective particle swarm optimization for fuzzy logic based active queue management. In *2006 IEEE International Conference on Fuzzy Systems*, pages 2231 – 2238, 2006.

[392] T. Okada, T. Watanabe, and K. Yasuda. Parameter tuning of fixed structure controller for power system stability enhancement. In *Transmission and Distribution Conference and Exhibition 2002: Asia Pacific. IEEE/PES*, pages 162 – 167 vol.1, 2002.

[393] T. Oku and A. Sano. Nonlinear blind source separation using coherence function. In *SICE 2003 Annual Conference*, pages 2550 – 2560 Vol.3, 2003.

[394] J. Olamaie and T. Niknam. Daily volt/var control in distribution networks with regard to dgs: a comparison of evolutionary methods. In *Power India Conference, 2006 IEEE*, page 6 pp., 2006.

[395] L.S. Oliveira, Jr. Britto A.S., and R. Sabourin. Improving cascading classifiers with particle swarm optimization. In *Document Analysis and Recognition, 2005. Proceedings. Eighth International Conference on*, pages 570 – 574 Vol. 2, 2005.

[396] L.S. Oliveira, Jr. Britto A.S., and R. Sabourin. Optimizing class-related thresholds with particle swarm optimization. In *Neural Networks, 2005. IJCNN '05. Proceedings. 2005 IEEE International Joint Conference on*, pages 1511 – 1516 vol. 3, 2005.

[397] M. O'Neill, A. Brabazon, and C. Adley. The automatic generation of programs for classification problems with grammatical swarm. In *Evolutionary Computation, 2004. CEC2004. Congress on*, pages 104 – 110 Vol.1, 2004.

[398] Chao Ou and Weixing Lin. Comparison between pso and ga for parameters optimization of pid controller. In *Proceedings of the 2006 IEEE International Conference on Mechatronics and Automation*, pages 2471 – 2475, 2006.

[399] Y. Owechko and S. Medasani. Cognitive swarms for rapid detection of objects and associations in visual imagery. In *Proceedings 2005 IEEE Swarm Intelligence Symposium, 2005. SIS 2005.*, pages 420 – 423, 2005.

[400] Y. Owechko, S. Medasani, and N. Srinivasa. Classifier swarms for human detection in infrared imagery. In *Computer Vision and Pattern Recognition Workshop, 2004 Conference on*, pages 121 – 121, 2004.

[401] J. Paetz. The particle swarm interval rule optimizer with an application to drug design data. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 2556 – 2562, 2006.

[402] P. Palangpour, G.K. Venayagamoorthy, and K. Duffy. Recurrent neural network based predictions of elephant migration in a south african game reserve. In *Neural Networks, 2006. IJCNN '06. International Joint Conference on*, pages 4084 – 4088, 2006.

[403] Quan-Ke Pan, M.F. Tasgetiren, and Yun-Chia Liang. A discrete particle swarm optimization algorithm for single machine total earliness and tardiness problem with a common due date. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 3281 – 3288, 2006.

[404] R.K. Pancholi and K.S. Swarup. Particle swarm optimization for economic dispatch with line flow and voltage constraints [power generation scheduling]. In *TENCON 2003. Conference on Convergent Technologies for Asia-Pacific Region*, pages 450 – 455 Vol.1, 2003.

[405] R.K. Pancholi and K.S. Swarup. Particle swarm optimization for security constrained economic dispatch. In *Intelligent Sensing and Information Processing, 2004. Proceedings of International Conference on*, pages 7 – 12, 2004.

[406] V. Ravikumar Pandi and B. K. Panigrahi. An evolutionary algorithm approach to estimate the parameters of power quality signals. In *Power Electronics, Drives and Energy Systems, 2006 International Conference on*, pages 1 – 6, 2006.

[407] Wei Pang, Kang ping Wang, Chun guang Zhou, and Long jiang Dong. Fuzzy discrete particle swarm optimization for solving traveling salesman problem. In *Computer and Information Technology, 2004. CIT '04. The Fourth International Conference on*, pages 796 – 800, 2004.

[408] Wei Pang, Kang-Ping Wang, Chun-Guang Zhou, Long-Jiang Dong, Ming Liu, Hong-Yan Zhang, and Jian-Yu Wang. Modified particle swarm optimization based on space transformation for solving traveling salesman problem. In *Machine Learning and Cybernetics, 2004. Proceedings of 2004 International Conference on*, pages 2342 – 2346 vol.4, 2004.

[409] R. Parisi, P. Croene, and A. Uncini. Particle swarm localization of acoustic sources in the presence of reverberation. In *Circuits and Systems, 2006. ISCAS 2006. Proceedings. 2006 IEEE International Symposium on*, page 4 pp., 2006.

[410] Jinho Park and D.J. Allstot. A 12.5 ghz rf matrix amplifier in 180nm soi cmos. In *Circuits and Systems, 2004. ISCAS '04. Proceedings of the 2004 International Symposium on*, pages I – 117–20 Vol.1, 2004.

[411] Jinho Park and D.J. Allstot. Rf circuit synthesis using particle swarm optimization. In *Circuits and Systems, 2004. ISCAS '04. Proceedings of the 2004 International Symposium on*, pages V–93 – V–96 Vol.5, 2004.

[412] Jinho Park, Kiyong Choi, and D.J. Allstot. Parasitic-aware design and optimization of a fully integrated cmos wideband amplifier. In *Design Automation Conference, 2003. Proceedings of the ASP-DAC 2003. Asia and South Pacific*, pages 904 – 907, 2003.

[413] Jong-Bae Park, Yun-Won Jeong, Woo-Nam Lee, and Joong-Rin Shin. An improved particle swarm optimization for economic dispatch problems with non-smooth cost functions. In *Power Engineering Society General Meeting, 2006. IEEE*, page 7 pp., 2006.

[414] Jong-Bae Park, Ki-Song Lee, Joong-Rin Shin, and K.Y. Lee. A particle swarm optimization for economic dispatch with nonsmooth cost functions. *IEEE Transactions on Power Systems*, 20:34 – 42, 2005.

[415] Jong-Bae Park, Ki-Song Lee, Joong-Rin Shin, and Y. Lee. Economic load dispatch for nonsmooth cost functions using particle swarm optimization. In *Power Engineering Society General Meeting, 2003, IEEE*, 2003.

[416] A. Paul, T.A.A. Victoire, and A.E. Jeyakumar. Particle swarm approach for retiming in vlsi. In *Circuits and Systems, 2003. MWSCAS '03. Proceedings of the 46th IEEE International Midwest Symposium on*, pages 1532 – 1535 Vol. 3, 2003.

[417] Jinchun Peng, Yaobin Chen, and R. Eberhart. Battery pack state of charge estimator design using computational intelligence approaches. In *Battery Conference on Applications and Advances, 2000. The Fifteenth Annual*, pages 173 – 177, 2000.

[418] J.R. Perez and J. Basterrechea. Particle swarm optimization for antenna far-field radiation pattern reconstruction. In *Microwave Conference, 2006. 36th European*, pages 687 – 690, 2006.

[419] C. Picardi and N. Rogano. Parameter identification of induction motor based on particle swarm optimization. In *Power Electronics, Electrical Drives, Automation and Motion, 2006. SPEEDAM 2006. International Symposium on*, pages 968 – 973, 2006.

[420] Ren Ping, Li Nan, Gao Liqun, Lin Zhiling, and Li Yang. Application of particle swarm optimization to the train scheduling for high-speed passenger railroad planning. In *Communications and Information Technology, 2005. ISCIT 2005. IEEE International Symposium on*, pages 581 – 584, 2005.

[421] Jess Ramn Prez and Jos Basterrechea. Comparison of different heuristic optimization methods for near-field antenna measurements. *IEEE Transactions on Antennas and Propagation*, 55, 2007.

[422] J. Pugh, A. Martinoli, and Y. Zhang. Particle swarm optimization for unsupervised robotic learning. In *Proceedings 2005 IEEE Swarm Intelligence Symposium, 2005. SIS 2005.*, pages 92 – 99, 2005.

[423] Wei Qiao and R.G. Harley. Fault-tolerant optimal neurocontrol for a static synchronous series compensator connected to a power network. In *The 2006 IEEE Industry Applications Conference Forty-First IAS Annual Meeting, Conference Record of*, pages 642 – 649, 2006.

[424] Wei Qiao, R.G. Harley, and G.K. Venayagamoorthy. A fault-tolerant p-q decoupled control scheme for static synchronous series compensator. In *Power Engineering Society General Meeting, 2006. IEEE*, page 8 pp., 2006.

[425] Wei Qiao, G.K. Venayagamoorthy, and R.G. Harley. Design of optimal pi controllers for doubly fed induction generators driven by wind turbines using particle swarm optimization. In *Neural Networks, 2006. IJCNN '06. International Joint Conference on*, pages 1982 – 1987, 2006.

[426] Yuan-Qing Qin, De-Bao Sun, Ning Li, and Yi-Gang Cen. Path planning for mobile robot using the particle swarm optimization with mutation operator. In *Machine Learning and Cybernetics, 2004. Proceedings of 2004 International Conference on*, pages 2473 – 2478 vol.4, 2004.

[427] Lijun Qiu, Yongjie Li, and Dezhong Yao. A feasibility study of eeg dipole source localization using particle swarm optimization. In *IEEE Congress on Evolutionary Computation, 2005. The 2005*, pages 720 – 726 Vol.1, 2005.

[428] Y. Rahmat-Samii. Implanted antennas for biotelemetry: antennas, safety and communications issues. In *Wireless Communication Technology, 2003. IEEE Topical Conference on*, pages 78 – 79, 2003.

[429] A. Ratnaweera, H.C. Watson, and S.K. Halgamuge. Optimisation of valve timing events of internal combustion engines with particle swarm optimisation. In *Evolutionary Computation, 2003. CEC '03. The 2003 Congress on*, pages 2411 – 2418 Vol.4, 2003.

[430] C. Reis, J.A. Tenreiro Machado, A.M.S.F. Galhano, and J. Boaventura Cunha. Circuit synthesis using particle swarm optimization. In *2006 IEEE International Conference on Computational Cybernetics*, pages 1 – 6, 2006.

[431] Ping Ren, Li-Qun Gao, Nan Li, Yang Li, and Zhi-Ling Lin. Transmission network optimal planning using the particle swarm optimization method. In *Proceedings of 2005 International Conference on Machine Learning and Cybernetics, 2005.*, pages 4006 – 4011 Vol. 7, 2005.

[432] Yuan Ren, Guang-Yi Cao, and Xin-Jian Zhu. Predictive control of proton exchange membrane fuel cell (pemfc) based on support vector regression machine. In *Machine Learning and Cybernetics, 2005. Proceedings of 2005 International Conference on*, pages 4028 – 4031 Vol. 7, 2005.

[433] Ziwu Ren and Ye San. Designing for rbf networks based on particle swarm optimization and regularized orthogonal least squares. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 2825 – 2829, 2006.

[434] H. W. Ressom, Y. Zhang, J. Xuan, Y. Wang, and R. Clarke. Inference of gene regulatory networks from time course gene expression data using neural networks and swarm intelligence. In *Computational Intelligence and Bioinformatics and Computational Biology, 2006. CIBCB '06. 2006 IEEE Symposium on*, pages 1 – 8, 2006.

[435] H.W. Ressom, R.S. Varghese, E. Orvisky, S.K. Drake, G.L. Hortin, M. Abdel-Hamid, C.A. Loffredo, and R. Goldman. Analysis of maldi-tof serum profiles for biomarker selection and sample classification. In *Computational Intelligence in Bioinformatics and Computational Biology, 2005. CIBCB '05. Proceedings of the 2005 IEEE Symposium on*, pages 1 – 7, 2005.

[436] H.W. Ressom, Yuji Zhang, Jianhua Xuan, Yue Wang, and R. Clarke. Inferring network interactions using recurrent neural networks and swarm intelligence. In *Engineering in Medicine and Biology Society, 2006. EMBS '06. 28th Annual International Conference of the IEEE*, pages 4241 – 4244, 2006.

[437] P.D. Reynolds, R.W. Duren, M.L. Trumbo, and II Marks R.J. Fpga implementation of particle swarm optimization for inversion of large neural networks. In *Proceedings 2005 IEEE Swarm Intelligence Symposium, 2005. SIS 2005.*, pages 389 – 392, 2005.

[438] C. Robertson, E. Trucco, and S. Ivekovic. Dynamic body posture tracking using evolutionary optimisation. In *Electronics Letters*, pages 1370 – 1371, 2005.

[439] J. Robinson and Y. Rahmat-Samii. Particle swarm optimization in electromagnetics. *IEEE Transactions on Antennas and Propagation*, 52:397 – 407, 2004.

[440] J. Robinson, S. Sinton, and Y. Rahmat-Samii. Particle swarm, genetic algorithm, and their hybrids: optimization of a profiled corrugated horn antenna. In *Antennas and Propagation Society International Symposium, 2002. IEEE*, pages 314 – 317 vol.1, 2002.

[441] R. Roy and S.P. Ghoshal. Evolutionary computation based optimization in fuzzy automatic generation control. In *Power India Conference, 2006 IEEE*, page 7 pp., 2006.

[442] Xu Rui, Anagnostopoulos C., and Wunsch II C. Multiclass cancer classification using semisupervised ellipsoid artmap and particle swarm optimization with gene expression data. *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, 2007.

[443] Xu Rui, Wunsch II C., and Frank L. Inference of genetic regulatory networks with recurrent neural network models using particle swarm optimization. In *IEEE/ACM Transactions on Computational Biology and Bioinformatics : Accepted for future publication*, pages 1 – 1, 2007.

[444] T.A. Runkler and C. Katz. Fuzzy clustering by particle swarm optimization. In *2006 IEEE International Conference on Fuzzy Systems*, pages 601 – 608, 2006.

[445] P. Saisan, S. Medasani, and Y. Owechko. Multi-view classifier swarms for pedestrian detection and tracking. In *Computer Vision and Pattern Recognition, 2005 IEEE Computer Society Conference on*, pages 18 – 18, 2005.

[446] J. Salerno. Using the particle swarm optimization technique to train a recurrent neural model. In *Ninth IEEE International Conference on Tools with Artificial Intelligence, 1997. Proceedings.*, pages 45 – 49, 1997.

[447] M. Saravanan, S.M.R. Slochanal, P. Venkatesh, and P.S. Abraham. Application of pso technique for optimal location of facts devices considering system loadability and cost of installation. In *Power Engineering Conference, 2005. IPEC 2005. The 7th International*, pages 716 – 721 Vol. 2, 2005.

[448] A. I. Selvakumar and K. Thanushkodi. A new particle swarm optimization solution to nonconvex economic dispatch problems. *IEEE Transactions on Power Systems*, 22:42 – 51, 2007.

[449] S.E. Selvan, C.C. Xavier, N. Karssemeijer, J. Sequeira, R.A. Cherian, and B.Y. Dhala. Parameter estimation in stochastic mammogram model by heuristic optimization techniques. *IEEE Transactions on Information Technology in Biomedicine*, 10:685 – 695, 2006.

[450] R. Senaratne and S. Halgamuge. Using particle swarm optimisation for elastic bunch graph matching to recognise faces. In *TENCON 2005 2005 IEEE Region 10*, pages 1 – 6, 2005.

[451] R. Senaratne and S. Halgamuge. Optimised landmark model matching for face recognition. In *Automatic Face and Gesture Recognition, 2006. FGR 2006. 7th International Conference on*, page 6 pp., 2006.

[452] P.S. Sensarma, M. Rahmani, and A. Carvalho. A comprehensive method for optimal expansion planning using particle swarm optimization. In *Power Engineering Society Winter Meeting, 2002. IEEE*, pages 1317 – 1322 vol.2, 2002.

[453] Shi M. Shan, Gui S. Deng, and Ying H. He. Data clustering using hybridization of clustering based on grid and density with pso. In *2006. SOLI '06. IEEE International Conference on Service Operations and Logistics, and Informatics*, pages 868 – 872, 2006.

[454] Gao Shang, Jiang Xin-zi, Tang Kezong, and Yang Jingyu. Hybrid algorithm combining ant colony optimization algorithm with particle swarm optimization. In *Chinese Control Conference, 2006*, pages 1428 – 1432, 2006.

[455] Yang ShangDong and Li Xiang. A new ann optimized by improved pso algorithm combined with chaos and its application in short-term load forecasting. In *Computational Intelligence and Security, 2006 International Conference on*, pages 945 – 948, 2006.

[456] Sheetal and G.K. Venayagamoorthy. Unmanned vehicle navigation using swarm intelligence. In *Intelligent Sensing and Information Processing, 2004. Proceedings of International Conference on*, pages 249 – 253, 2004.

[457] Xianjun Shen, Yuanxiang Li, Weiwu Wang, and Bojin Zheng. A dynamic adaptive particle swarm optimization for knapsack problem. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 3183 – 3187, 2006.

[458] A. Sheta. Reliability growth modeling for software fault detection using particle swarm optimization. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 3071 – 3078, 2006.

[459] Xiaomeng Shi, Kiat Seng Yeo, Jian-Guo Ma, Manh Anh Do, and Erping Li. Scalable model of on-wafer interconnects for high-speed cmos ics. *IEEE Transactions on [see also Components, Packaging and Manufacturing Technology, Part B: Advanced Packaging, IEEE Transactions on] Advanced Packaging*, 29:770 – 776, 2006.

[460] M.A. Shoorehdeli, M. Teshnehlab, and H.A. Moghaddam. Feature subset selection for face detection using genetic algorithms and particle swarm optimization. In *2006. ICNSC '06. Proceedings of the 2006 IEEE International Conference on Networking, Sensing and Control*, pages 686 – 690, 2006.

[461] Jun Shu, Lizi Zhang, Bing Han, and Xianchao Huang. Global generator and transmission maintenance scheduling based on a mixed intelligent optimal algorithm in power market. In *Power System Technology, 2006. PowerCon 2006. International Conference on*, pages 1 – 5, 2006.

[462] N. Sinha and Loi-Lei Lai. Meta heuristic search algorithms for short-term hydrothermal scheduling. In *Machine Learning and Cybernetics, 2006 International Conference on*, pages 4050 – 4056, 2006.

[463] Nidul Sinha and B. Purkayastha. Pso embedded evolutionary programming technique for nonconvex economic load dispatch. In *Power Systems Conference and Exposition, 2004. IEEE PES*, pages 66 – 71 vol.1, 2004.

[464] O. Sjahputera and J.M. Keller. Particle swarm over scene matching. In *Proceedings 2005 IEEE Swarm Intelligence Symposium, 2005. SIS 2005.*, pages 108 – 115, 2005.

[465] W.H. Slade, H.W. Ressom, M.T. Musavi, and R.L. Miller. Inversion of ocean color observations using particle swarm optimization. *IEEE Transactions on Geoscience and Remote Sensing*, 42:1915 – 1923, 2004.

[466] S. Mary Raja Slochanal, S. Kannan, and R. Rengaraj. Generation expansion planning in the competitive environment. In *Power System Technology, 2004. PowerCon 2004. 2004 International Conference on*, pages 1546 – 1549 Vol.2, 2004.

[467] J. Solis, D. Saez, and P.A. Estevez. Particle swarm optimization-based fuzzy predictive control strategy. In *2006 IEEE International Conference on Fuzzy Systems*, pages 1866 – 1871, 2006.

[468] Ying Song, Zengqiang Chen, and Zhuzhi Yuan. New chaotic pso-based neural network predictive control for nonlinear process. *IEEE Transactions on Neural Networks*, 18:595 – 601, 2007.

[469] T. Sousa, A. Neves, and A. Silva. Swarm optimisation as a new tool for data mining. In *Parallel and Distributed Processing Symposium, 2003. Proceedings. International*, page 6 pp., 2003.

[470] D. Srinivasan, Wee Hoon Loo, and Ruey Long Cheu. Traffic incident detection using particle swarm optimization. In *the 2003 IEEE Swarm Intelligence Symposium, 2003. SIS '03. Proceedings of*, pages 144 – 151, 2003.

[471] S. Srinoy and W. Kurutach. Combination artificial ant clustering and k-pso clustering approach to network security model. In *Hybrid Information Technology, 2006. ICHIT'06. Vol 2. International Conference on*, pages 128 – 134, 2006.

[472] G. Steiner and D. Watzenig. Particle swarm optimization for worst case tolerance design. In *2003 IEEE International Conference on Industrial Technology*, pages 78 – 82 Vol.1, 2003.

[473] G. Steiner and H. Zangl. Worst case circuit design of capacitive sensor electronics with steepest descent particle swarm optimization. In *2004. IEEE ICIT '04. 2004 IEEE International Conference on Industrial Technology*, pages 1198 – 1203 Vol. 3, 2004.

[474] M. Sugisaka and X. Fan. An effective search method for nn-based face detection using pso. In *SICE 2004 Annual Conference*, pages 2742 – 2745 vol. 3, 2004.

[475] I.A. Sulistijono and N. Kubota. Human clustering for a partner robot based on particle swarm optimization. In *Robot and Human Interactive Communication, 2006. ROMAN 2006. The 15th IEEE International Symposium on*, pages 686 – 691, 2006.

[476] Changyin Sun and Dengcai Gong. Support vector machines with pso algorithm for short-term load forecasting. In *2006. ICNSC '06. Proceedings of the 2006 IEEE International Conference on Networking, Sensing and Control*, pages 676 – 680, 2006.

[477] Hong-Guang Sun, Yu-Xue Pan, and Yun-Feng Zhang. Apso based gabor wavelet feature extraction method. In *Machine Learning and Cybernetics, 2004. Proceedings of 2004 International Conference on*, pages 3888 – 3893 vol.6, 2004.

[478] Hongguang Sun, Yuxue Pan, and Yunfeng Zhang. Pso based gabor wavelet feature extraction method. In *Information Acquisition, 2004. Proceedings. International Conference on*, pages 422 – 425, 2004.

[479] Qin Sun, Yuhui Shi, R.C. Eberhart, and W.A. Bauson. Utilizing particle swarm optimization to label a structured beam matrix. In *the 2003 IEEE Swarm Intelligence Symposium, 2003. SIS '03. Proceedings of*, pages 118 – 123, 2003.

[480] Tsung-Ying Sun, Sheng-Ta Hsieh, Hsiang-Min Wang, and Cheng-Wei Lin. Floorplanning based on particle swarm optimization. In *Emerging VLSI Technologies and Architectures, 2006. IEEE Computer Society Annual Symposium on*, page 5 pp., 2006.

[481] Wei Sun, Ying-Xia Zhang, and Fang-Tao Li. The neural network model based on pso for short-term load forecasting. In *Machine Learning and Cybernetics, 2006 International Conference on*, pages 3069 – 3072, 2006.

[482] Lee T.-Y. Operating schedule of battery energy storage system in a time-of-use rate industrial user with wind turbine generators: A multipass iteration particle swarm optimization approach. *IEEE Transactions on Energy Conversion : Accepted for future publication*, PP:1 – 1, 2007.

[483] Tomoya Takahashi, Masaki Yamakita, and Sang-Ho Hyon. An optimization approach for underactuated running robot. In *SICE-ICASE, 2006. International Joint Conference*, pages 3505 – 3510, 2006.

[484] H. Talbi and M. Batouche. Hybrid particle swarm with differential evolution for multimodal image registration. In *2004. IEEE ICIT '04. 2004 IEEE International Conference on Industrial Technology*, pages 1567 – 1572 Vol. 3, 2004.

[485] H. Talbi and M.C. Batouche. Particle swam optimization for image registration. In *Information and Communication Technologies: From Theory to Applications, 2004. Proceedings. 2004 International Conference on*, pages 397 – 398, 2004.

[486] E.K. Tang, P.N. Suganthan, and X. Yao. Feature selection for microarray data using least squares svm and particle swarm optimization. In *Computational Intelligence in Bioinformatics and Computational Biology, 2005. CIBCB '05. Proceedings of the 2005 IEEE Symposium on*, pages 1 – 8, 2005.

[487] W.H. Tang, S. He, E. Prempain, Q.H. Wu, and J. Fitch. A particle swarm optimiser with passive congregation approach to thermal modelling for power transformers. In *IEEE Congress on Evolutionary Computation, 2005. The 2005*, pages 2745 – 2751 Vol. 3, 2005.

[488] M.F. Tasgetiren, M. Sevkli, Yun-Chia Liang, and G. Gencyilmaz. Particle swarm optimization algorithm for single machine total weighted tardiness problem. In *Evolutionary Computation, 2004. CEC2004. Congress on*, pages 1412 – 1419 Vol.2, 2004.

[489] B. Tatomir and L. Rothkrantz. Hierarchical routing in traffic using swarm-intelligence. In *Intelligent Transportation Systems, 2006. Proceedings. 2006 IEEE*, pages 230 – 235, 2006.

[490] P. Tawdross and A. Konig. Investigation of particle swarm optimization for dynamic reconfiguration of field-programmable analog circuits. In *Hybrid Intelligent Systems, 2005. Fifth International Conference on*, page 6 pp., 2005.

[491] P. Tawdross, S.K. Lakshmanan, and A. Konig. Intrinsic evolution of predictable behavior evolvable hardware in dynamic environment. In *Hybrid Intelligent Systems, 2006. HIS '06. Sixth International Conference on*, pages 60 – 60, 2006.

[492] Choon Fang Teo, Yun Cie Foo, Su Fong Chien, A.L.Y. Low, B. Venkatesh, and A.H. You. Optimal placement of wavelength converters in wdm networks using particle swarm optimizer. In *2004 IEEE International Conference on Communications*, pages 1669 – 1673, 2004.

[493] T. Thakur, Kanik Sem, Sumedha Saini, and Sudhanshu Sharma. A particle swarm optimization solution to no2 and so2 emissions for environmentally constrained economic dispatch problem. In *Transmission & Distribution Conference and Exposition: Latin America, 2006. TDC '06. IEEE/PES*, pages 1 – 5, 2006.

[494] C. Thitithamrongchai and B. Eua-Arporn. Economic load dispatch for piecewise quadratic cost function using hybrid self-adaptive differential evolution with augmented lagrange multiplier method. In *Power System Technology, 2006. PowerCon 2006. International Conference on*, pages 1 – 8, 2006.

[495] B.B. Thompson, II Marks R.J., M.A. El-Sharkawi, W.J. Fox, and R.T. Miyamoto. Inversion of neural network underwater acoustic model for estimation of bottom parameters using modified particle swarm optimizers. In *Neural Networks, 2003. Proceedings of the International Joint Conference on*, pages 1301 – 1306 vol.2, 2003.

[496] Wang Tianzhu, Li Wenhui, Wang Yi, Ge Zihou, and Han Dongfeng. Stochastic collision detection between deformable models using particle swarm optimization algorithm. In *Multi-Media Modelling Conference Proceedings, 2006 12th International*, page 4 pp., 2006.

[497] J. Tillett, R. Rao, and F. Sahin. Cluster-head identification in ad hoc sensor networks using particle swarm optimization. In *2002 IEEE International Conference on Personal Wireless Communications*, pages 201 – 205, 2002.

[498] T.O. Ting, T.S. Lee, and T. Htay. Performance analysis of grinding process via particle swarm optimization. In *Computational Intelligence and Multimedia Applications, 2005. Sixth International Conference on*, pages 92 – 97, 2005.

[499] Guofeng Tong, Zheng Fang, and Xinhe Xu. A particle swarm optimized particle filter for nonlinear system state estimation. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 438 – 442, 2006.

[500] Du-Ming Tsai, Yan-Hsin Tseng, Shin-Min Chao, and Chao-Hsuan Yen. Independent component analysis based filter design for defect detection in low-contrast textured images. In *Pattern Recognition, 2006. ICPR 2006. 18th International Conference on*, pages 231 – 234, 2006.

[501] T. Tsukada, T. Tamura, S. Kitagawa, and Y. Fukuyama. Optimal operational planning for cogeneration system using particle swarm optimization. In *the 2003 IEEE Swarm Intelligence Symposium, 2003. SIS '03. Proceedings of*, pages 138 – 143, 2003.

[502] M.F. Uddin and A.M. Youssef. Cryptanalysis of simple substitution ciphers using particle swarm optimization. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 677 – 680, 2006.

[503] S.P. Umayal and N. Kamaraj. Stochastic multi objective short term hydrothermal scheduling using particle swarm optimization. In *INDICON, 2005 Annual IEEE*, pages 497 – 501, 2005.

[504] K. Valarmathi, D. Devaraj, and T.K. Radhakrishnan. Particle swarm optimization based pi controller tuning for fermentation process. In *Computational Intelligence for Modelling, Control and Automation, 2005 and International Conference on Intelligent Agents, Web Technologies and Internet Commerce, International Conference on*, pages 1043 – 1048, 2005.

[505] F. van den Bergh A.P. Engelbrecht. Training product unit networks using cooperative particle swarm optimisers. In *Neural Networks, 2001. Proceedings. IJCNN '01. International Joint Conference on*, pages 126 – 131 vol.1, 2001.

[506] D.W. van der Merwe and A.P. Engelbrecht. Data clustering using particle swarm optimization. In *Evolutionary Computation, 2003. CEC '03. The 2003 Congress on*, pages 215 – 220 Vol.1, 2003.

[507] K. Veeramachaneni and L.A. Osadciw. Multiple sectors, multi function, multi radar dwell time management using particle swarm optimization (m3rtm). In *2006 IEEE Conference on Radar*, page 7 pp., 2006.

[508] K. Veeramachaneni, L.A. Osadciw, and P.K. Varshney. An adaptive multimodal biometric management algorithm. *IEEE Transactions on Systems, Man and Cybernetics, Part C*, 35:344 – 356, 2005.

[509] G. K. Venayagamoorthy and W. Zha. Comparison of nonuniform optimal quantizer designs for speech coding with adaptive critics and particle swarm. *IEEE Transactions on Industry Applications*, 43:238 – 244, 2007.

[510] G.K. Venayagamoorthy. Optimal control parameters for a upfc in a multimachine using pso. In *Intelligent Systems Application to Power Systems, 2005. Proceedings of the 13th International Conference on*, page 6 pp., 2005.

[511] G.K. Venayagamoorthy and S. Doctor. Navigation of mobile sensors using pso and embedded pso in a fuzzy logic controller. In *Industry Applications Conference, 2004. 39th IAS Annual Meeting. Conference Record of the 2004 IEEE*, pages 1200 – 1206 vol.2, 2004.

[512] G.K. Venayagamoorthy and V.G. Gudise. Swarm intelligence for digital circuits implementation on field programmable gate arrays platforms. In *Evolvable Hardware, 2004. Proceedings. 2004 NASA/DoD Conference on*, pages 83 – 86, 2004.

[513] T.A.A. Victoire and A.E. Jeyakumar. Reserve constrained dynamic dispatch of units with valve-point effects. *IEEE Transactions on Power Systems*, 20:1273 – 1282, 2005.

[514] J.G. Vlachogiannis and K.Y. Lee. Determining generator contributions to transmission system using parallel vector evaluated particle swarm optimization. *IEEE Transactions on Power Systems*, 20:1765 – 1774, 2005.

[515] J.G. Vlachogiannis and K.Y. Lee. Reactive power control based on particle swarm multi-objective optimization. In *Intelligent Systems Application to Power Systems, 2005. Proceedings of the 13th International Conference on*, page 5 pp., 2005.

[516] J.G. Vlachogiannis and K.Y. Lee. A comparative study on particle swarm optimization for optimal steady-state performance of power systems. *IEEE Transactions on Power Systems*, 21:1718 – 1728, 2006.

[517] J.G. Vlachogiannis and K.Y. Lee. Coordinated aggregation particle swarm optimization applied in reactive power and voltage control. In *Power Engineering Society General Meeting, 2006. IEEE*, page 6 pp., 2006.

[518] S. von Mammen, C. Jacob, and G. Kokai. Evolving swarms that build 3d structures. In *IEEE Congress on Evolutionary Computation, 2005. The 2005*, pages 1434 – 1441 Vol. 2, 2005.

[519] M.P. Wachowiak, R. Smolikova, Yufeng Zheng, J.M. Zurada, and A.S. Elmaghraby. An approach to multimodal biomedical image registration utilizing particle swarm optimization. *IEEE Transactions on Evolutionary Computation*, 8:289 – 301, 2004.

[520] Bo Wang, Yunlong Dong, CanLin Wang, and QinLin Qu. A new particle swarm optimizer algorithm and application. In *Systems and Control in Aerospace and Astronautics, 2006. ISSCAA 2006. 1st International Symposium on*, page 4 pp., 2006.

[521] Bo Wang and Zhihai He. Performance optimization of wireless video sensor networks using swarm optimization with convex mapping. In *2006 IEEE International Conference on Image Processing*, pages 1293 – 1296, 2006.

[522] Cui-Ru Wang and Yun-E Zhang. Distribution network reconfiguration basedl on modified particle swarm optimization algorithm. In *Machine Learning and Cybernetics, 2006 International Conference on*, pages 2076 – 2080, 2006.

[523] Cui-Ru Wang, Chun-Lei Zhou, and Jian-Wei Ma. An improved artificial fish-swarm algorithm and its application in feed-forward neural networks. In *Machine Learning and Cybernetics, 2005. Proceedings of 2005 International Conference on*, pages 2890 – 2894 Vol. 5, 2005.

[524] Cuiru Wang, Jiangwei Zhang, Jing Yang, Chaoju Hu, and Jun Liu. A modified particle swarm optimization algorithm and its application for solving traveling salesman problem. In *Neural Networks and Brain, 2005. ICNN&B '05. International Conference on*, pages 689 – 694, 2005.

[525] Jiesheng Wang and Wei Wang. A predictive model of sinter chemical composition and its application. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 4856 – 4860, 2006.

[526] Jun Wang and Xiang Yang Li. Personalized on-line service of particle swarm optimization cluster analysis algorithm. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 6073 – 6077, 2006.

[527] Junwei Wang, Xingwei Wang, and Min Huang. A hybrid intelligent qos multicast routing algorithm in ngi. In *Parallel and Distributed Computing, Applications and Technologies, 2005. PDCAT 2005. Sixth International Conference on*, pages 723 – 727, 2005.

[528] Junwei Wang, Xingwei Wang, and Min Huang. A hybrid intelligent qos multicast routing algorithm in ngi. In *Communication Technology,. 2006. ICCT '06. International Conference on*, pages 1 – 4, 2006.

[529] Junwei Wang, Xingwei Wang, and Min Huang. An intelligent qos multicast routing algorithm under inaccurate information. In *Computational Intelligence and Security, 2006 International Conference on*, pages 1073 – 1077, 2006.

[530] Kang-Ping Wang, Lan Huang, Chun-Guang Zhou, and Wei Pang. Particle swarm optimization for traveling salesman problem. In *Machine Learning and Cybernetics, 2003 International Conference on*, pages 1583 – 1585 Vol.3, 2003.

[531] Kejun Wang, Qingchang Guo, Dayan Zhuang, Hongxia Chu, and Bin Fu. Application of snake model based on pso in the image segmentation. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 9637 – 9640, 2006.

[532] L. Wang and C. Singh. Reserve-constrained multiarea environmental/economic dispatch using enhanced particle swarm optimization. In *Systems and Information Engineering Design Symposium, 2006 IEEE*, pages 96 – 100, 2006.

[533] Lei Wang, Qi Kang, and Qidi Wu. Grouped-and-delayed broadcasting mechanism for optimum information in particle swarm optimization. In *2004 IEEE Conference on Cybernetics and Intelligent Systems*, pages 372 – 376 vol.1, 2004. Volume 1, 1-3 Dec. 2004.

[534] Lei Wang, Qi Kang, and Qidi Wu. A particle swarm optimization approach for procedure parameters optimization of semiconductor assembly product line. In *2006. ICNSC '06. Proceedings of the 2006 IEEE International Conference on Networking, Sensing and Control*, pages 664 – 669, 2006.

[535] Li Wang, Yushu Liu, Hongbin Deng, and Yuanqing Xu. Obstacle-avoidance path planning for soccer robots using particle swarm optimization. In *2006. ROBIO '06. IEEE International Conference on Robotics and Biomimetics*, pages 1233 – 1238, 2006.

[536] Li Wang, Yushu Liu, Xinxin Zhao, and Yuanqing Xu. Particle swarm optimization for fuzzy c-means clustering. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 6055 – 6058, 2006.

[537] Lingfeng Wang and Chanan Singh. Pso-based multidisciplinary design of a hybrid power generation system with statistical models of wind speed and solar insolation. In *Power Electronics, Drives and Energy Systems, 2006 International Conference on*, pages 1 – 6, 2006.

[538] Lingfeng Wang and Chanan Singh. Stochastic combined heat and power dispatch based on multi-objective particle swarm optimization. In *Power Engineering Society General Meeting, 2006. IEEE*, page 8 pp., 2006.

[539] Lingfeng Wang and Chanan Singh. Tradeoff between risk and cost in economic dispatch including wind power penetration using particle swarm optimization. In *Power System Technology, 2006. PowerCon 2006. International Conference on*, pages 1 – 7, 2006.

[540] Shuhong Wang, Jie Qiu, Zhen Zhao, Xinying Liu, Jian Guo Zhu, Youguang Guo, and Zhi Wei Lin. Robust optimization of multilayer conductors of hts ac cable using pso and perturbation analysis. In *The 2006 IEEE Industry Applications Conference Forty-First IAS Annual Meeting, Conference Record of*, pages 293 – 299, 2006.

[541] Wen Wang, Yilong Lu, J.S. Fu, and Yong Zhong Xiong. Particle swarm optimization and finite-element based approach for microwave filter design. *IEEE Transactions on Magnetics*, 41:1800 – 1803, 2005.

[542] Xiuli Wang, Yongji Wang, Hui Zhou, and Xiaoyong Huai. Pso-pid: a novel controller for aqm routers. In *Wireless and Optical Communications Networks, 2006 IFIP International Conference on*, page 5 pp., 2006.

[543] Yi Wang, Wen-Hui Li, Tian-Zhu Wang, Wu Guo, and Zhen-Hua Zhang. An efficient collision detection of complex deformable objects based on particle swarm optimization algorithm. In *Machine Learning and Cybernetics, 2006 International Conference on*, pages 3964 – 3969, 2006.

[544] Yi Wang, Wen-Hui Li, Tian-Zhu Wang, Wu Guo, and Zhen-Hua Zhang. An efficient collision detection of complex deformable objects based on particle swarm optimization algorithm. In *Machine Learning and Cybernetics, 2006 International Conference on*, pages 1001 – 1006, 2006.

[545] YuShen Wang, KeJun Wang, JiaSheng Qu, and YuRong Yang. Adaptive inverse control based on particle swarm optimization algorithm. In *2005 IEEE International Conference Mechatronics and Automation*, pages 2169 – 2172 Vol. 4, 2005.

[546] Z. Wang, G.L. Durst, R.C. Eberhart, D.B. Boyd, and Z.B. Miled. Particle swarm optimization and neural network application for qsar. In *Parallel and Distributed Processing Symposium, 2004. Proceedings. 18th International*, page 194, 2004.

[547] Zhancheng Wang, Bufu Huang, Weimin Li, and Yangsheng Xu. Particle swarm optimization for operational parameters of series hybrid electric vehicle. In *2006. ROBIO '06. IEEE International Conference on Robotics and Biomimetics*, pages 682 – 688, 2006.

[548] I. Watanabe. An aco algorithm for service restoration in power distribution systems. In *IEEE Congress on Evolutionary Computation, 2005. The 2005*, pages 2864 – 2871 Vol. 3, 2005.

[549] Zhao wei Wang and Xiang qian Liu. Model order reduction based on particle swarm optimization. In *not known*, 2006.

[550] Xia Weijun, Wu Zhiming, Zhang Wei, and Yang Genke. A new hybrid optimization algorithm for the job-shop scheduling problem. In *American Control Conference, 2004. Proceedings of the 2004*, pages 5552 – 5557 vol.6, 2004.

[551] WeiZhng, KunWang, and Shouzhi-Li. Increment pid controller based on immunity particle swarm optimization algorithm. In *Computational Engineering in Systems Applications, IMACS Multiconference on*, pages 1947 – 1951, 2006.

[552] R.L. Welch and G.K. Venayagamoorthy. Comparison of two optimal control strategies for a grid independent photovoltaic system. In *The 2006 IEEE Industry Applications Conference Forty-First IAS Annual Meeting, Conference Record of*, pages 1120 – 1127, 2006.

[553] Jr. Slade W.H., H. Ressom, M.T. Musavi, and R.L. Miller. Ocean color inversion by particle swarm optimization. In *Evolutionary Computation, 2004. CEC2004. Congress on*, pages 971 – 977 Vol.1, 2004.

[554] R. Wrobel and P.H. Mellor. Particle swarm optimisation for the design of brushless permanent magnet machines. In *The 2006 IEEE Industry Applications Conference Forty-First IAS Annual Meeting, Conference Record of*, pages 1891 – 1897, 2006.

[555] Bin Wu, Wanliang Wang, Yanwei Zhao, Xinli Xu, and Fengyu Yang. A novel real number encoding method of particle swarm optimization for vehicle routing problem. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 3271 – 3275, 2006.

[556] F. Wu, Zheng Yen, Yunhe Hou, and Yixin Ni. Applications of ai techniques to generation planning and investment. In *Power Engineering Society General Meeting, 2004. IEEE*, pages 936 – 940 Vol.1, 2004.

[557] Guo-Hua Wu and Rong-Yang Wu. Identification of convection heat transfer coefficient parameters based on hybrid particle swarm algorithm in the secondary cooling zone for steel continuous casting process. In *Computational Intelligence Methods and Applications, 2005 ICSC Congress on*, page 6 pp., 2005.

[558] Jiansheng Wu, Lingzhi Wang, and Baoxiang Zhu. The meteorological prediction model study of neural ensemble based on pso algorithms. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 51 – 55, 2006.

[559] X.H. Wu, A.A. Kishk, and A.W. Glisson. A transmission line method to compute the far-field radiation of arbitrarily directed hertzian dipoles in a multilayer dielectric structure: Theory and applications. *IEEE Transactions on Antennas and Propagation*, 54:2731 – 2741, 2006.

[560] Xuan Hui Wu, A.A. Kishk, and A.W. Glisson. Antenna modeling by frequncy dependent hertzian dipoles using particle swarm optimization. In *Antennas and Propagation Society International Symposium 2006, IEEE*, pages 3527 – 3530, 2006.

[561] Xue-Jing Wu, Hong Zhou, and Xiao-Wei Tan. Single machine scheduling with common due date based on pso integrated with heuristics. In *2006. SOLI '06. IEEE International Conference on Service Operations and Logistics, and Informatics*, pages 728 – 733, 2006.

[562] Changcheng Xiang, Xiyue Huang, Darong Huang, and Jia Hu. Wavelets neural network based on particle swarm optimization algorithm for fault diagnosis. In *Innovative Computing, Information and Control, 2006. ICICIC '06. First International Conference on*, pages 320 – 323, 2006.

[563] Jian-Mei Xiao and Xi-Huai Wang. Nonlinear neural network predictive control for power unit using particle swarm optimization. In *Machine Learning and Cybernetics, 2006 International Conference on*, pages 2851 – 2856, 2006.

[564] Jianmei Xiao. Research on neural network predictive control based on particle swarm optimization. In *Intelligent Control and Automation, 2004. WCICA 2004. Fifth World Congress on*, pages 603 – 606 Vol.1, 2004.

[565] Lizhong Xiao, Zhiqing Shao, and Gang Liu. K-means algorithm based on particle swarm optimization algorithm for anomaly intrusion detection. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 5854 – 5858, 2006.

[566] Xiang Xiao, E.R. Dow, R. Eberhart, Z.B. Miled, and R.J. Oppelt. Gene clustering using self-organizing maps and particle swarm optimization. In *Parallel and Distributed Processing Symposium, 2003. Proceedings. International*, page 10 pp., 2003.

[567] Yuan Xiaohui, Yuan Yanbin, Wang Cheng, and Zhang Xiaopan. An improved pso approach for profit-based unit commitment in electricity market. In *Transmission and Distribution Conference and Exhibition: Asia and Pacific, 2005 IEEE/PES*, pages 1 – 4, 2005.

[568] Lei Xie and Liying Jiang. Global optimal ica and its application in brain meg data analysis. In *Neural Networks and Brain, 2005. ICNN&B '05. International Conference on*, pages 353 – 357, 2005.

[569] Xiao-Feng Xie, Wen-Jun Zhang, and De-Chun Bi. Optimizing semiconductor devices by self-organizing particle swarm. In *Evolutionary Computation, 2004. CEC2004. Congress on*, pages 2017 – 2022 Vol.2, 2004.

[570] Yin Xinchun and Liu Tao. Searching for costas arrays using general particle swarm optimization. In *TENCON 2006. 2006 IEEE Region 10 Conference*, pages 1 – 3, 2006.

[571] Fasheng Xu and Wei Chen. Stochastic portfolio selection based on velocity limited particle swarm optimization. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 3599 – 3603, 2006.

[572] Jia Xu, Shaojun Li, and Feng Qian. Application of multiobjective particle swarm optimization in missile effectiveness optimization. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 3499 – 3503, 2006.

[573] Lin Xu, Xiaoke Fang, Qichao Fang, Jianhui Wang, and Shusheng Gu. Study of strip flatness and gauge complex control based on improved pso-rbf neural networks. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 6397 – 6400, 2006.

[574] Rui Xu, Georgios C. Anagnostopoulos, and Donald C. Wunsch. Multiclass cancer classification using semisupervised ellipsoid artmap and particle swarm optimization with gene expression data. In *Computational Biology and Bioinformatics, IEEE/ACM Transactions on*, pages 65 – 77, 2007.

[575] Rui Xu, Xindi Cai, and D.C. Wunsch. Gene expression data for dlbcl cancer survival prediction with a combination of machine learning technologies. In *Engineering in Medicine and Biology Society, 2005. IEEE-EMBS 2005. 27th Annual International Conference of the*, pages 894 – 897, 2005.

[576] Rui Xu and II Wunsch D.C. Gene regulatory networks inference with recurrent neural network models. In *Neural Networks, 2005. IJCNN '05. Proceedings. 2005 IEEE International Joint Conference on*, pages 286 – 291 vol. 1, 2005.

[577] Rui Xu, Xiao Hu, and II Wunsch D.C. Inference of genetic regulatory networks with recurrent neural network models. In *Engineering in Medicine and Biology Society, 2004. EMBC 2004. Conference Proceedings. 26th Annual International Conference of the*, pages 2905 – 2908 Vol.4, 2004.

[578] Xiaohui Xu and An Zhang. An unsupervised particle swarm optimization classifier for sar image. In *Computational Intelligence and Security, 2006 International Conference on*, pages 1630 – 1634, 2006.

[579] Yi-Chun Xu and Ren-Bin Xiao. Hybrid particle swarm algorithm for packing of unequal circles in a larger containing circle. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 3381 – 3385, 2006.

[580] Yite Xu and Dazhen Ye. Application of velocity-changeable discrete particle swarm optimization algorithm for blind detection. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 3509 – 3513, 2006.

[581] Zhi xu Chen, Li zi Zhang, and Jun Shu. Congestion management based on particle swarm optimization. In *Power Engineering Conference, 2005. IPEC 2005. The 7th International*, pages 1019 – 1023 Vol. 2, 2005.

[582] Yun-Can Xue, Qi-Wen Yang, and Jun Feng. Improved particle swarm optimization algorithm for optimum steelmaking charge plan based on the pseudo tsp solution. In *Machine Learning and Cybernetics, 2005. Proceedings of 2005 International Conference on*, pages 5452 – 5457 Vol. 9, 2005.

[583] Yuncan Xue, Xinnan Fan, and Wei Jian. Improved particle swarm optimization algorithm for integrated steel-making optimum charge plan. In *Industrial Electronics Society, 2004. IECON 2004. 30th Annual Conference of IEEE*, pages 2197 – 2200 Vol. 3, 2004.

[584] Yuncan Xue, Jun Feng, and Fei Liu. Modified particle swarm optimization algorithm for steelmaking charge plan with unknown charge number. In *American Control Conference, 2006*, page 5 pp., 2006.

[585] Yuncan Xue, Qiwen Yang, and Wei Jian. Improved particle swarm optimization algorithm for optimum charge plan for steelmaking-continuous casting production scheduling. In *2005. INDIN '05. 2005 3rd IEEE International Conference on Industrial Informatics*, pages 558 – 561, 2005.

[586] Yuncan Xue, Haibin Zhao, and Qiwen Yang. Self-tuning of pid parameters based on the modified particle swarm optimization. In *2006 IEEE International Conference on Industrial Informatics*, pages 870 – 873, 2006.

[587] Zhang Xue-wen and Li Yan-jun. New algorithm for economic load dispatch of power systems. In *Chinese Control Conference, 2006*, pages 678 – 681, 2006.

[588] Y. Yamada, K. Ookoudo, and Y. Komura. Layout optimization of manufacturing cells and allocation optimization of transport robots in reconfigurable manufacturing systems using particle swarm optimization. In *Intelligent Robots and Systems, 2003. (IROS 2003). Proceedings. 2003 IEEE/RSJ International Conference on*, pages 2049 – 2054 vol.2, 2003.

[589] Dong Yan, Zhou Chi, Suo Siliang, and Huang Zailu. Adaptive bandwidth allocation based on particle swarm optimization for multimedia leo satellite systems. In *Communications and Networking in China, 2006. ChinaCom '06. First International Conference on*, pages 1 – 6, 2006.

[590] Hongwen Yan and Rui Ma. Design a novel neural network clustering algorithm based on pso and application. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 6015 – 6018, 2006.

[591] Liping Yan and Jianchao Zeng. Using particle swarm optimization and genetic programming to evolve classification rules. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 3415 – 3419, 2006.

[592] yan Liu and Xueping Gu. Reconfiguration of network skeleton based on discrete particle-swarm optimization for black-start restoration. In *Power Engineering Society General Meeting, 2006. IEEE*, page 7 pp., 2006.

[593] Y. Yang, R.S. Chen, Z.B. Ye, and Z. Liu. Fdtd time series extrapolation by the least squares support vector machine method with the particle swarm optimization technique. In *Microwave Conference Proceedings, 2005. APMC 2005. Asia-Pacific Conference Proceedings*, page 3 pp., 2005.

[594] Yahong YANG, Fuqing ZHAO, Yunping YAO, and Aihong ZHU. A pso and simulated annealing hybrid algorithm to task allocation problem for holonic manufacturing system. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 6767 – 6771, 2006.

[595] Zhang Yangyang, Ji Chunlin, Yuan Ping, Li Manlin, Wang Chaojin, and Wang Guangxing. Particle swarm optimization for base station placement in mobile communication. In *2004 IEEE International Conference on Networking, Sensing and Control*, pages 428 – 432 Vol.1, 2004.

[596] Yunping Yao, Youtang Li, Fuqing Zhao, and Yahong Yang. A scheduling holon model with time petri net and its solution with a novel pso-ga algorithm. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 6616 – 6620, 2006.

[597] Beng-Kiong Yeo and Yilong Lu. Adaptive array digital beamforming using complex-coded particle swarm optimization-genetic algorithm. In *Microwave Conference Proceedings, 2005. APMC 2005. Asia-Pacific Conference Proceedings*, page 3 pp., 2005.

[598] Fang Yi, Zheng Chongxun, Pan Chen, and Liu Li. White blood cell image segmentation using on-line trained neural network. In *Engineering in Medicine and Biology Society, 2005. IEEE-EMBS 2005. 27th Annual International Conference of the*, pages 6476 – 6479, 2005.

[599] Wang Yi, Li Wenhui, Wang Tianzhu, Han Dongfeng, and Meng Yu. Collision detection for deforming linear objects using particle swarm optimization. In *2006 IEEE International Conference on Granular Computing*, pages 465 – 468, 2006.

[600] Jun yi Cao and Bing gang Cao. Design of fractional order controllers based on particle swarm optimization. In *2006 1ST IEEE Conference on Industrial Electronics and Applications*, pages 1 – 6, 2006. May 2006.

[601] H. Yoshida, Y. Fukuyama, S. Takayama, and Y. Nakanishi. A particle swarm optimization for reactive power and voltage control in electric power systems considering voltage security assessment. In *1999. IEEE SMC '99 Conference Proceedings. 1999 IEEE International Conference on Systems, Man, and Cybernetics*, pages 497 – 502 vol.6, 1999.

[602] H. Yoshida, K. Kawata, Y. Fukuyama, S. Takayama, and Y. Nakanishi. A particle swarm optimization for reactive power and voltage control considering voltage security assessment. *IEEE Transactions on Power Systems*, 15:1232 – 1239, 2000.

[603] H. Yoshida, K. Kawata, Y. Fukuyama, S. Takayama, and Y. Nakanishi. A particle swarm optimization for reactive power and voltage control considering voltage security assessment. In *Power Engineering Society Winter Meeting, 2001. IEEE*, page 498 vol.2, 2001.

[604] Zhihong Yu, Xiaoxin Zhou, and Zhongxi Wu. Design of a fast transient stability control scheme in power system. In *Power Engineering Society General Meeting, 2006. IEEE*, page 8 pp., 2006.

[605] Ping Yuan, Chunlin Ji, Yangyang Zhang, and Yue Wang. Optimal multicast routing in wireless ad hoc sensor networks. In *2004 IEEE International Conference on Networking, Sensing and Control*, pages 367 – 371 Vol.1, 2004.

[606] Yong Yuan, Zhihai He, and Min Chen. Virtual mimo-based cross-layer design for wireless sensor networks. *IEEE Transactions on Vehicular Technology*, 55:856 – 864, 2006.

[607] Zhihao Yuan, Ronghong Jin, Junping Geng, Yu Fan, Jia Lao, Jiaqiang Li, Xianyi Rui, Zhijiang Fang, and Jing Sun. A perturbation particle swarm optimization for the synthesis of the radiation pattern of antenna array. In *Microwave Conference Proceedings, 2005. APMC 2005. Asia-Pacific Conference Proceedings*, page 4 pp., 2005.

[608] Fu yuan Huang, Rong jun Li, Han xia Liu, and Rui Li. A modified particle swarm algorithm combined with fuzzy neural network with application to financial risk early warning. In *Services Computing, 2006. APSCC '06. IEEE Asia-Pacific Conference on*, pages 168 – 173, 2006.

[609] S.H. Zainud-Deen, K.R. Mahmoud, M. El-Adawy, and S.M.M. Ibrahem. Design of yagi-uda antenna and electromagnetically coupled curl antenna using particle swarm optimization algorithm. In *Radio Science Conference, 2005. NRSC 2005. Proceedings of the Twenty-Second National*, pages 115 – 124, 2005.

[610] H.H. Zeineldin, E.F. El-Saadany, and M.M.A. Salama. Protective relay coordination for micro-grid operation using particle swarm optimization. In *Power Engineering, 2006 Large Engineering Systems Conference on*, pages 152 – 157, 2006.

[611] Jianchao Zeng and Zbihua Cui. Particle swarm optimizer with integral controller. In *Neural Networks and Brain, 2005. ICNN&B '05. International Conference on*, pages 1840 – 1842, 2005.

[612] Xiangping Zeng, Yunlong Zhu, Lin Nan, Kunyuan Hu, Ben Niu, and Xiaoxian He. Solving weapon-target assignment problem using discrete particle swarm optimization. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 3562 – 3565, 2006.

[613] W. Zha and G.K. Venayagamoorthy. Comparison of non-uniform optimal quantizer designs for speech coding with adaptive critics and particle swarm. In *Industry Applications Conference, 2005. Fourtieth IAS Annual Meeting. Conference Record of the 2005*, pages 674 – 679 Vol. 1, 2005.

[614] W. Zha and G.K. Venayagamoorthy. Neural networks based non-uniform scalar quantizer design with particle swarm optimization. In *Proceedings 2005 IEEE Swarm Intelligence Symposium, 2005. SIS 2005.*, pages 143 – 148, 2005.

[615] Chunkai Zhang and Hong Hu. Using pso algorithm to evolve an optimum input subset for a svm in time series forecasting. In *2005 IEEE International Conference on Systems, Man and Cybernetics*, pages 3793 – 3796 Vol. 4, 2005.

[616] Chunkai Zhang, Huihe Shao, and Yu Li. Particle swarm optimisation for evolving artificial neural network. In *2000 IEEE International Conference on Systems, Man, and Cybernetics*, pages 2487 – 2490 vol.4, 2000.

[617] D. Zhang, X. Liu, and Z. Guan. A dynamic clustering algorithm based on pso and its application in fuzzy identification. In *Intelligent Information Hiding and Multimedia Signal Processing, 2006. IIH-MSP '06. International Conference on*, pages 232 – 235, 2006.

[618] Hang Zhang and Dayong Luo. A pso-based method for traffic stop-sign detection. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 8625 – 8629, 2006.

[619] Jianhua Zhang and Hong Wang. Control of networked robotic manipulator via ilc and minimum entropy. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 9499 – 9503, 2006.

[620] Lei Zhang, Yuehui Chen, and Bo Yang. Task scheduling based on pso algorithm in computational grid. In *Intelligent Systems Design and Applications, 2006. ISDA '06. Sixth International Conference on*, pages 696 – 704, 2006.

[621] Libiao Zhang, Chunguang Zhou, Ming Ma, Xiaohua Liu, Chunxia Li, Caitang Sun, and Miao Liu. Fuzzy kernel clustering based on particle swarm optimization. In *2006 IEEE International Conference on Granular Computing*, pages 428 – 430, 2006.

[622] Mingju Zhang, Lei Zhang, Yanfeng Sun, Lin Feng, and Weiying Ma. Auto cropping for digital photographs. In *2005. ICME 2005. IEEE International Conference on Multimedia and Expo*, page 4 pp., 2005.

[623] Rubo Zhang and Jing Liu. Underwater image segmentation with maximum entropy based on particle swarm optimization (pso). In *Computer and Computational Sciences, 2006. IMSCCS '06. First International Multi-Symposiums on*, pages 360 – 636, 2006.

[624] W. Zhang and Y. Liu. Fuzzy logic controlled particle swarm for reactive power optimization considering voltage stability. In *Power Engineering Conference, 2005. IPEC 2005. The 7th International*, 2005.

[625] Wei Zhang, Gen-Ke Yang, and Zhi-Ming Wu. Genetic programming-based modeling on chaotic time series. In *Machine Learning and Cybernetics, 2004. Proceedings of 2004 International Conference on*, pages 2347 – 2352 vol.4, 2004.

[626] Wen Zhang and Yutian Liu. Reactive power optimization based on pso in a practical power system. In *Power Engineering Society General Meeting, 2004. IEEE*, pages 239 – 243 Vol.1, 2004.

[627] Xian Zhang, Jinsha Yuan, and Xueming Yang. An improved hybrid particle swarm optimization method for distribution network planning. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 7470 – 7474, 2006.

[628] Xiaoguang Zhang, Li Yu, Yuan Zheng, Yu Shen, Guangtao Zhou, Lixia Xi, and Bojun Yang. Adaptive pmd compensation using pso algorithm. In *Optical Fiber Communication Conference, 2004. OFC 2004*, page 3 pp. vol.2, 2004.

[629] Xiaoguang Zhang, Yuan Zheng, Yu Shen, Jianzhong Zhang, and Bojun Yang. Particle swarm optimization used as a control algorithm for adaptive pmd compensation. In *Photonics Technology Letters, IEEE*, pages 85 – 87, 2005.

[630] Yan Zhang, Yu Meng, Wen-Hui Li, and Yun-Jie Pang. A fast algorithm for image analogy using particle swarm optimization. In *Machine Learning and Cybernetics, 2004. Proceedings of 2004 International Conference on*, pages 4043 – 4048 vol.7, 2004.

[631] Yan Zhang, Yu Meng, Wen-Hui Li, Yun-Jie Pang, and Hong-Peng Wang. Particle swarm optimization-based texture synthesis and texture transfer. In *Machine Learning and Cybernetics, 2004. Proceedings of 2004 International Conference on*, pages 4037 – 4042 vol.7, 2004.

[632] Yan Zhang, Yu Meng, Wenhui Li, and Yunjie Pang. Texture synthesis using particle swarm optimization. In *Communications, Circuits and Systems, 2004. ICCCAS 2004. 2004 International Conference on*, pages 969 – 973 Vol.2, 2004.

[633] Yangyang Zhang and W.Q. Malik. Analogue filter tuning for antenna matching with multiple objective particle swarm optimization. In *Advances in Wired and Wireless Communication, 2005 IEEE/Sarnoff Symposium on*, pages 196 – 198, 2005.

[634] Yangyang Zhang and D.C. O'Brien. Fixed channel assignment in cellular radio networks using particle swarm optimization. In *Industrial Electronics, 2005. ISIE 2005. Proceedings of the IEEE International Symposium on*, pages 1751 – 1756, 2005.

[635] Yufei Zhang, Z. Dang, and Jie Wei. Research and simulation of fuzzy controller design based on particle swarm optimization. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 3757 – 3761, 2006.

[636] Zhiyong Zhang and Guoxia Qiu. Blind detection of multi-user signals in fading channels via discrete particle swarm optimization. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 1697 – 1701, 2006.

[637] B. Zhao, C.X. Guo, and Y.J. Cao. Improved particle swam optimization algorithm for opf problems. In *Power Systems Conference and Exposition, 2004. IEEE PES*, pages 233 – 238 vol.1, 2004.

[638] B. Zhao, C.X. Guo, and Y.J. Cao. An improved particle swarm optimization algorithm for optimal reactive power dispatch. In *Power Engineering Society General Meeting, 2005. IEEE*, pages 272 – 279 Vol. 1, 2005.

[639] B. Zhao, C.X. Guo, and Y.J. Cao. A multiagent-based particle swarm optimization approach for optimal reactive power dispatch. *IEEE Transactions on Power Systems*, 20:1070 – 1078, 2005.

[640] Bo Zhao, Chuangxin Guo, and Yijia Cao. Dynamic economic dispatch in electricity market using particle swarm optimization algorithm. In *Intelligent Control and Automation, 2004. WCICA 2004. Fifth World Congress on*, pages 5050 – 5054 Vol.6, 2004.

[641] Fu-Qing Zhao, Qiu-Yu Zhang, and Ya-Hong Yang. An improved particle swarm optimization(pso) algorithm and fuzzy inference systems based approach to process planning and production scheduling integration in holonic manufacturing system (hms). In *Machine Learning and Cybernetics, 2006 International Conference on*, pages 396 – 401, 2006.

[642] Fuqing Zhao, Yi Hong, Dongmei Yu, Qiuyu Zhang, and Yahong Yang. Application of a hybrid particle swarm optimization algorithm to dynamic holon reconfiguring problem. In *Pervasive Computing and Applications, 2006 1st International Symposium on*, pages 416 – 421, 2006.

[643] Fuqing Zhao, Zongyi Ren, Dongmei Yu, and Yahong Yang. Application of an improved particle swarm optimization algorithm for neural network training*. In *Neural Networks and Brain, 2005. ICNN&B '05. International Conference on*, pages 1693 – 1698, 2005.

[644] Fuqing Zhao, Qiuyu Zhang, and Yahong Yang. An improved particle swarm optimization-based approach for production scheduling problems. In *Proceedings of the 2006 IEEE International Conference on Mechatronics and Automation*, pages 2279 – 2283, 2006.

[645] Fuqing Zhao, Qiuyu Zhang, and Yahong Yang. A novel task allocation problem solution with pso algorithm for holonic manufacturing system. In *Computer Supported Cooperative Work in Design, 10th International Conference on*, pages 1 – 6, 2006.

[646] Fuqing Zhao, Qiuyu Zhang, and Yahong Yang. A scheduling holon modeling method with petri net and its optimization with a novel pso-ga algorithm. In *Computer Supported Cooperative Work in Design, 10th International Conference on*, pages 1 – 6, 2006.

[647] Fuqing Zhao, Aihong Zhu, Zongyi Ren, and Yahong Yang. Integration of process planning and production scheduling based on a hybrid pso and sa algorithm. In *Proceedings of the 2006 IEEE International Conference on Mechatronics and Automation*, pages 2290 – 2295, 2006.

[648] Fuqing Zhao, Aihong Zhu, Dongmei Yu, and Yahong Yang. A hybrid particle swarm optimization(pso) algorithm schemes for integrated process planning and production scheduling. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 6772 – 6776, 2006.

[649] Jianyu Zhao, Lei Jia, Yuehui Chen, and Xudong Wang. Urban traffic flow forecasting model of double rbf neural network based on pso. In *Intelligent Systems Design and Applications, 2006. ISDA '06. Sixth International Conference on*, pages 892 – 896, 2006.

[650] Xianzhang Zhao, Junfang Zeng, Yibo Gao, and Yiping Yang. Particle swarm algorithm for classification rules generation. In *Intelligent Systems Design and Applications, 2006. ISDA '06. Sixth International Conference on*, pages 957 – 962, 2006.

[651] Xiaoqiang Zhao and Gang Rong. Blending scheduling based on particle swarm optimization algorithm. In *2004. IRI 2004. Proceedings of the 2004 IEEE International Conference on Information Reuse and Integration*, pages 618 – 622, 2004.

[652] Ying Zhao and Junli Zheng. Particle swarm optimization algorithm in signal detection and blind extraction. In *Parallel Architectures, Algorithms and Networks, 2004. Proceedings. 7th International Symposium on*, pages 37 – 41, 2004.

[653] Peng Zheng, Juan Guo, and Xiao-Jing Hao. Hybrid strategies for optimizing continuous casting process of steel. In *2004. IEEE ICIT '04. 2004 IEEE International Conference on Industrial Technology*, pages 1156 – 1161 Vol. 3, 2004.

[654] He Zhenya, Wei Chengjian, Yang Luxi, Gao Xiqi, Yao Susu, R.C. Eberhart, and Yuhui Shi. Extracting rules from fuzzy neural network by particle swarm optimisation. In *The 1998 IEEE International Conference on Evolutionary Computation Proceedings, 1998. IEEE World Congress on Computational Intelligence.*, pages 74 – 77, 1998.

[655] X.H. Zhi, X.L. Xing, Q.X. Wang, L.H. Zhang, X.W. Yang, C.G. Zhou, and Y.C. Liang. A discrete pso method for generalized tsp problem. In *Machine Learning and Cybernetics, 2004. Proceedings of 2004 International Conference on*, pages 2378 – 2383 vol.4, 2004.

[656] Liao Zhihua and Han Chuanjiu. Bandwidth allocation for fc-al based on pso. In *Communication Technology,. 2006. ICCT '06. International Conference on*, pages 1 – 4, 2006.

[657] Jin Zhiyong and Zhang Qizhi. The nonholonomic motion planning and control of the unicycle mobile robot. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 3461 – 3465, 2006.

[658] Chi Zhou, Liang Gao, Haibing Gao, and Chuanyong Peng. Pattern classification and prediction of water quality by neural network with particle swarm optimization. In *Intelligent Control and Automation, 2006. WCICA 2006. The Sixth World Congress on*, pages 2864 – 2868, 2006.

[659] Guang Yu Zhu. Drilling path optimization based on swarm intelligent algorithm. In *2006. ROBIO '06. IEEE International Conference on Robotics and Biomimetics*, pages 193 – 196, 2006.

[660] Hong Zhu, Demin Wang, Wengang Zhou, Xin Liu, and Ping Hu. Research on the application of the case library based on grid using particle swarm optimization. In *2006. ICNSC '06. Proceedings of the 2006 IEEE International Conference on Networking, Sensing and Control*, pages 681 – 685, 2006.

[661] Qing Zhu, Limin Qian, Yingchun Li, and Shanjun Zhu. An improved particle swarm optimization algorithm for vehicle routing problem with time windows. In *IEEE Congress on Evolutionary Computation, 2006. CEC 2006.*, pages 1386 – 1390, 2006.