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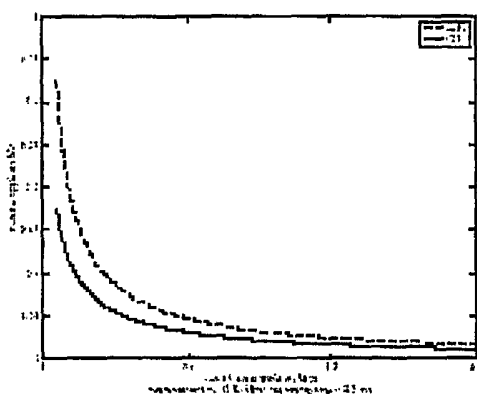
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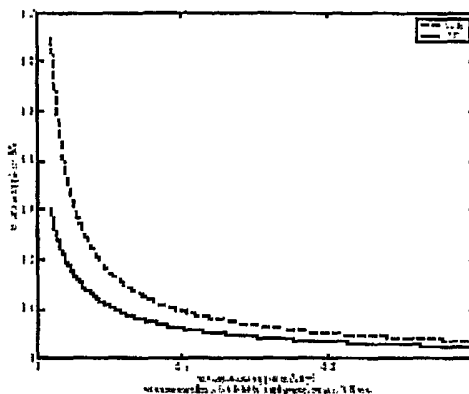
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(54) Title: PRACTICAL PULSE SYNTHESIS VIA THE DISCRETE INVERSE SCATTERING TRANSFORM



(a) Transition width = 0.3 KHz,
rephasing time = 2.0 us



(b) Transition width = 0.1 KHz,
rephasing time = 5.0 us

(57) Abstract: The discrete inverse scattering (DIST) approach is used to design selective RF pulses. As in SLR, a hard pulse approximation is used to actually design the pulse. Unlike SLR, the pulse is designed using the full inverse scattering data (the reflection coefficient and the bound states) rather than the flip angle profile. The reflection coefficient is approximated in order to obtain a pulse with a prescribed rephasing time. In contrast to the SLR approach, direct control on the phase of the magnetization profile is retained throughout the design process. Explicit recursive algorithms are provided for computing the hard pulse from the inverse scattering data. These algorithms are essentially discretizations of the Marchenko equations. When bound states are present, both the left and right Marchenko equations are used in order to improve the numerical stability of the algorithm. The DIST algorithm is used in preferred applications to generate pulses for use in magnetic resonance imaging, although it has applications in other two-level quantum systems such as quantum computing and spintronics.

WO 2004/055526 A3



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER IPC(7) : G01V 3/00 US CL : 324/300-309 According to International Patent Classification (IPC) or to both national classification and IPC		
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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,449,376 A (CALLAHAN) 12 SEPTEMBER 1995 (12.09.1995), SEE ENTIRE DOCUMENT.	1-29
A	US 5,572,126 A (SHINNAR) 05 NOVEMBER 1996 (05.11.1996), SEE ENTIRE DOCUMENT.	1-29
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
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"O"	document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed	
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Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer Diego Gutierrez Telephone No. (571) 272-2245 <div style="text-align: right;"> Jean Proctor Paralegal SP </div>	