



(51) International Patent Classification:

G09B 9/10 (2006.01) G09B 9/14 (2006.01)
G09B 9/12 (2006.01) G09B 9/18 (2006.01)

(21) International Application Number:

PCT/US2020/057260

(22) International Filing Date:

25 October 2020 (25.10.2020)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/925,957 25 October 2019 (25.10.2019) US

(71) Applicant: **JOBY AERO, INC.** [US/US]; 340 Woodpecker Ridge, Santa Cruz, CA 95060 (US).

(72) Inventors: **BEVIRT, JoeBen**; 340 Woodpecker Ridge, Santa Cruz, CA 95060 (US). **STOLL, Alex**; 340 Woodpecker Ridge, Santa Cruz, CA 95060 (US). **MIKIC, Gregor, Veble**; 129 Hubbard Street Apt. A, Santa Cruz, CA 95060 (US). **BAIN, Jeremy**; 106 Whitaker Drive, Stockbridge, GA 30281 (US).

(74) Agent: **GUTH, Michael, A.**; 2-2905 East Cliff Drive, Santa Cruz, CA 95062 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW,

(54) Title: AERODYNAMIC INTERACTIONS IN COMPLEX EVTOL FOR FLIGHT SIMULATION

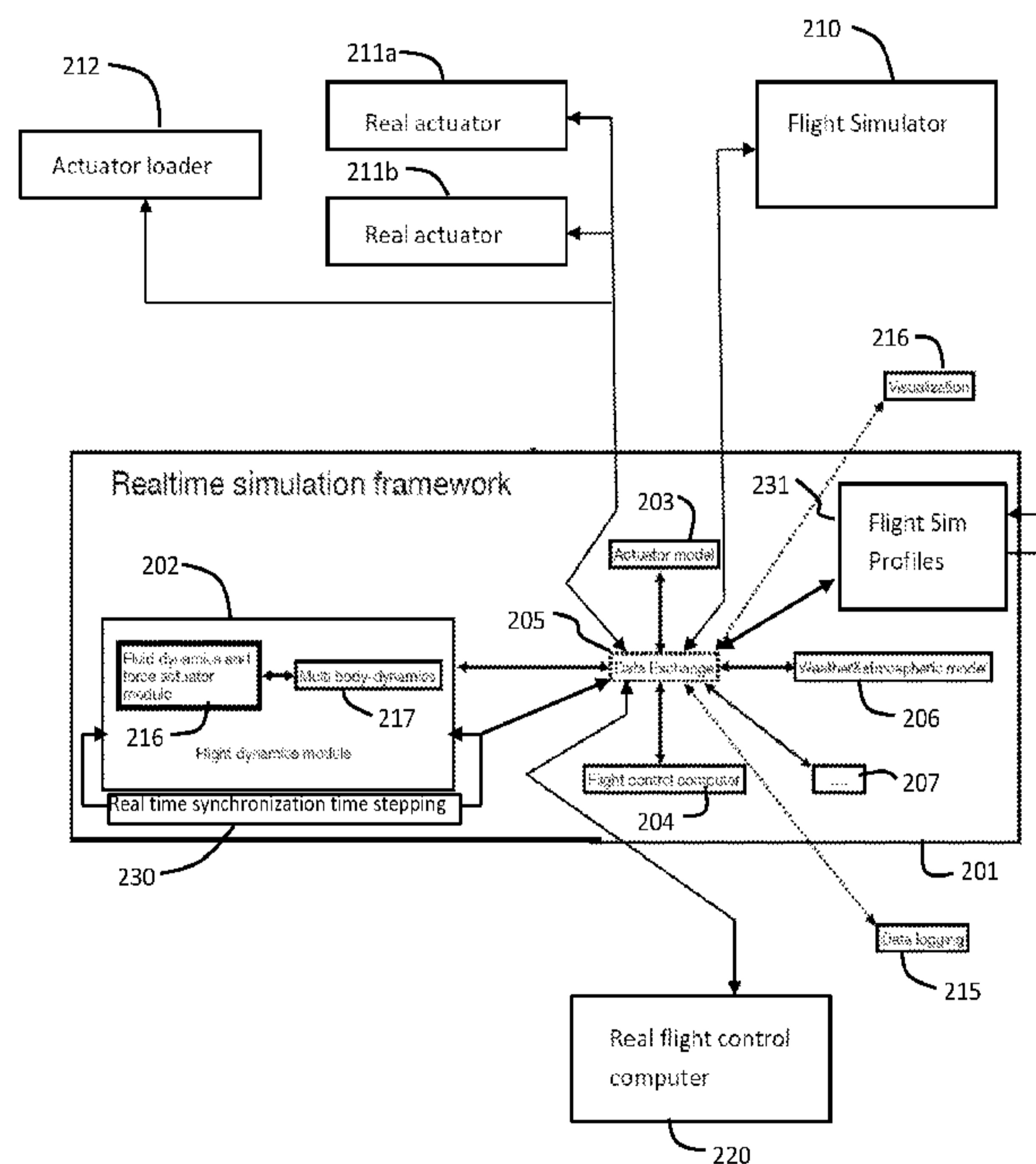


FIG. 4

(57) Abstract: A method and system for modeling aerodynamic interactions in complex eVTOL configurations for realtime flight simulations and hardware testing which includes decomposing the aircraft into aerodynamic subcomponents, wherein the interactions between these components are handled by flow simulations of the surrounding fluid, which may be Euler flow CFD simulations. A computer generated simulation can be used to analyze the fluid flow and pressures, the forces delivered by an aircraft into the fluid and the forces onto the aircraft from the fluid, to determine the position and attitude of the aircraft, and other aspects. The system may be used as a flight simulator for pilot training in a realtime environment. The system may be used to support component testing using an interface to those components, such as flight electronics and actuators, to test the components in high fidelity simulations of actual flight demands on those components. The system may also be used to support design analysis in non-realtime to run numerous simulations



SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(88) Date of publication of the international search report:

24 June 2021 (24.06.2021)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US20/57260

<p>A. CLASSIFICATION OF SUBJECT MATTER</p> <p>IPC - G09B 9/10; G09B 9/12; G09B 9/14; G09B 9/18 (2020.01)</p> <p>CPC - G08G 5/0039; G08G 5/0047; G09B 9/12; G09B 9/14; G05D 1/0016; G05D 1/0202; G05D 1/101; G09B 9/10; G09B 9/18; G09B 9/301; G09B 9/44</p> <p>According to International Patent Classification (IPC) or to both national classification and IPC</p>																													
<p>B. FIELDS SEARCHED</p> <p>Minimum documentation searched (classification system followed by classification symbols) See Search History document</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched See Search History document</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) See Search History document</p>																													
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:10%;">Category*</th> <th style="width:70%;">Citation of document, with indication, where appropriate, of the relevant passages</th> <th style="width:20%;">Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>Y — A</td> <td>WO 2010/068780 A1 (V SQUARED WIND, INC.) 17 June 2010; paragraphs [00101], [00185], [00215], [00282]-[00286], [00300], [00327]</td> <td>1, 3, 10, 11 — 2, 4-9</td> </tr> <tr> <td>Y — A</td> <td>EP 0493072 A2 (HITACHI EUROPE LIMITED) 01 July 1992; column 7, line 33-42 column 24, line 4-24; column 26, line 35-44</td> <td>1, 3, 10, 11 — 2, 4-9</td> </tr> <tr> <td>Y — A</td> <td>US 2019/0088156 A1 (AURORA FLIGHT SCIENCES CORPORATION) 21 March 2019; paragraphs [0072], [0074], [0076], [0158], [0161]; claim 1</td> <td>10, 11 — 1-9</td> </tr> <tr> <td>A</td> <td>WO 2008/108881 A2 (SULLIVAN, S) 12 September 2008; entire document</td> <td>1-11</td> </tr> <tr> <td>A</td> <td>WO 2013/134705 A1 (ENGINE SIMULATION PARTNERS) 12 September 2013; entire document</td> <td>1-11</td> </tr> <tr> <td>A</td> <td>US 2018/0366011 A1 (THALES) 20 December 2018; entire document</td> <td>1-11</td> </tr> <tr> <td>A</td> <td>US 2008/0095652 A1 (JIANG, Z) 24 April 2008; entire document</td> <td>1-11</td> </tr> <tr> <td>A</td> <td>US 2013/0096890 A1 (VANDERHEYDEN, W ET AL.) 18 April 2013; entire document</td> <td>1-11</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	Y — A	WO 2010/068780 A1 (V SQUARED WIND, INC.) 17 June 2010; paragraphs [00101], [00185], [00215], [00282]-[00286], [00300], [00327]	1, 3, 10, 11 — 2, 4-9	Y — A	EP 0493072 A2 (HITACHI EUROPE LIMITED) 01 July 1992; column 7, line 33-42 column 24, line 4-24; column 26, line 35-44	1, 3, 10, 11 — 2, 4-9	Y — A	US 2019/0088156 A1 (AURORA FLIGHT SCIENCES CORPORATION) 21 March 2019; paragraphs [0072], [0074], [0076], [0158], [0161]; claim 1	10, 11 — 1-9	A	WO 2008/108881 A2 (SULLIVAN, S) 12 September 2008; entire document	1-11	A	WO 2013/134705 A1 (ENGINE SIMULATION PARTNERS) 12 September 2013; entire document	1-11	A	US 2018/0366011 A1 (THALES) 20 December 2018; entire document	1-11	A	US 2008/0095652 A1 (JIANG, Z) 24 April 2008; entire document	1-11	A	US 2013/0096890 A1 (VANDERHEYDEN, W ET AL.) 18 April 2013; entire document	1-11
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<p>Date of the actual completion of the international search</p> <p>26 March 2021 (26.03.2021)</p>		<p>Date of mailing of the international search report</p> <p align="center">APR 12 2021</p>																											
<p>Name and mailing address of the ISA/US</p> <p>Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300</p>		<p>Authorized officer</p> <p align="center">Shane Thomas</p> <p>Telephone No. PCT Helpdesk: 571-272-4300</p>																											