Jared A. Grauer

Research Aerospace Engineer
Silver Spring, MD

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jared.a.grauer@nasa.gov
jared.grauer@gmail.com

Education

- **University of Maryland** — College Park, MD
  Ph.D., Aerospace Engineering — *2007–2011*
  - Dissertation: "Modeling and System Identification of an Ornithopter Flight Dynamics Models"
  - Advised by Dr. James E. Hubbard Jr., NAE
  - Focus in flight dynamics and control
- **University of Maryland** — College Park, MD
  M.S., Aerospace Engineering — *2005–2007*
  - Advised by Dr. James E. Hubbard Jr., NAE
  - Focus in rotorcraft and structural dynamics
- **University of Maryland** — College Park, MD
  B.S., Aerospace Engineering — *2001–2005*
  - Advised by Dr. Alison B. Flatau
  - Focus in aeronautics

Professional Experience

- **NASA Langley Research Center** — Hampton, VA
  Research Aerospace Engineer, Dynamic Systems and Control Branch — *2010–Present*
  - X-59 Quiet SuperSonic Technology (QueSST).
  - Artemis Human Landing System (HLS).
  - Integrated Adaptive Wing Technology Maturation (IAWTM) wind tunnel test.
  - Aero-Fusion Early Career Initiative (ECI).
  - Urban Air Mobility Intelligent Contingency Management.
  - X-56A Multi-Utility Technology Testbed (MUTT).
  - Learn-to-Fly (L2F).
  - Aviation Safety Program.
  - GL-10 Greased Lightning.
  - Subsonic Ultra Green Aircraft Research (SUGAR) wind tunnel test.

- **University of Maryland** College Park, MD
  Lecturer, Department of Aerospace Engineering *2020–Present*
  - ENAE 432 Control of Aerospace Systems
  - ENAE 642 Atmospheric Flight Control
  - ENAE 788B Aircraft System Identification

- **University of Maryland** College Park, MD
  Graduate Research Assistant, Department of Aerospace Engineering *2005–2011*
  - Studied the flight dynamics of bird-sized flapping-wing vehicles for reconnaissance applications. Identified dynamic models from wind tunnel and flight tests using system identification techniques. Developed time-period linear control laws for stabilization in flight.
  - Served as teaching assistant for ENAE 757 Advanced Structural Dynamics, ENAE 656 Introduction to Structural Dynamics, ENAE 100 Introduction to Aerospace Systems, and ENES 100 Introduction to Engineering Design.

- **Carr Astronautics Corporation** Washington, DC
  Intern *2004*
  - Adapted high-fidelity simulation software to new satellite configuration.
  - Surveyed international community of users subscribing to GOES satellite weather data.

- **University of Maryland** College Park, MD
  Undergraduate Research Assistant, Department of Aerospace Engineering *2001–2005*
  - Supported a Ph.D. student in experimentally modeling synthetic jet actuators in flows.
  - Designed and machined components for wind tunnel tests.

Honors and Awards

- NASA Superior Accomplishment Group Award to the System Identification Team for the RS-25 Engine, awarded on 08 August 2023, "For excellent and timely system identification analysis of the RS-25 engines for the Space Launch System engine test."
- NASA Early Career Initiative (ECI) Award, awarded by the Space Technology Mission Directorate (STMD) in October 2020 for "AeroFusion" to leverage advances in data science to improve the aerodynamic database generation process at NASA for entry vehicles.
- NASA Early Career Achievement Medal (ECAM), awarded "For outstanding contributions in system identification and real-time frequency response estimation, with broad applicability within aerospace and other fields." Award presented on 17 September 2019 at the NASA Langley Awards Ceremony by center director David Bowles and Clayton Turner.
- 2017 ARMD Associate Administrator (AA) Award under the Smartest Failure category, awarded to the X-56A project team by NASA Associate Administrator for the Aeronautics Research Mission Directorate Jaiwon Shin on 16 April 2018.
- "Dave Ward Memorial Lecture Award" awarded "For outstanding contributions in the field of system identification and real-time frequency response estimation that enable stability margin monitoring for ensuring the safety of high-risk flight testing, and the broad applicability of these contributions to aerospace and many other domains," presented by the Aerospace Control and Guidance Systems Committee on 1 Nov 2017.
- "Laurence J. Bement Young Professional award," presented by the Hampton Roads AIAA section for the paper "Generic Global Model for Aircraft," awarded first place on May 4, 2016.

- "Center Group Award," presented by Center Director David Bowles, NASA Langley Research Center, 13 September 2015 for participation in the Greased Lightning GL-10 team.
- "Laurence J. Bement Young Professional award," presented by the Hampton Roads AIAA section for the paper "A Method for Real-Time Frequency Response and Uncertainty Estimation," awarded second place on May 22, 2013.
- "Laurence J. Bement Young Professional award," presented by the Hampton Roads AIAA section for the paper "Testing and System Identification of an Ornithopter in Longitudinal Flight," awarded first place on May 15, 2012.
- "Doctoral Research Award," awarded by the University of Maryland Department of Aerospace Engineering on April 21, 2010.
- Best paper award for "Control Model for Robotic Samara: Dynamics about a Coordinated Helical Turn," American Controls Conference, 2010.
- Full scholarship from Deutscher Akademischer Austausch Dienst to study in Germany, 2005.

Professional Memberships

- American Institute for Aeronautics and Astronautics (AIAA)
  - Associate Fellow, 2019
  - Senior Member, 2014
  - Lifetime member, 2001
- AIAA Atmospheric Flight Mechanics Technical Committee, 2011–Present
  - Chair, 2025–2027
  - Vice-chair, 2023–2025
  - Secretary, 2021–2023
- Aerospace Control and Guidance Systems Committee (ACGSC)
  - Planning Advisory Board (PAB), 2019–Present
  - Member, 2016–present
- Vertical Flight Society (VFS), 2019–Present
- Plain Language Action and Information Network (PLAIN), 2024
- Permanent employee status, NASA, 2014
- Sigma Gamma Tau, 2004
- Order of the Engineer, 2004

Professional Service

- **AIAA Atmospheric Flight Mechanics (AFM) Technical Committee**
  Member *2011–Present*
  - (future) Chair, 2025–2027
  - Vice Chair, 2023–2025
  - Secretary, 2021–2023
  - Technical Discipline Chair for AFM at SciTech Forum, 2021, 2024, 2025
  - Technical Discipline Chair for AFM at Aviation Forum, 2017
  - Membership Subcommittee Chair, 2021–2023
  - Publications Subcommittee Chair, 2011-2018
  - Member, Flight Test and Parameter Identification Subcommittee, 2011–Present
- **ACGSC Planning Advisory Board**
  Member *2019–Present*
  - Subcommittee C Avionics and System Integration, 2021–present
  - Subcommittee E Flight, Propulsion, and Autonomous Vehicle Control Systems, 2019–2021
- Journal Reviewer
  - Journal of Guidance, Control, and Dynamics
  - Journal of Aircraft
  - Several others
- Invited to and served on the Publications Review Subcommittee (PRS) of the AIAA Publications Committee, chaired under Mr. David Arthur (AIAA) and Dr. Noel Clemens (UT Austin), as a subject matter expert to conduct a thorough review of the AIAA Journal of Aircraft, 2023.

Invited Talks and Seminars

1. Grauer, J., "STEAM Day Visit," invited talk given to Sra. Hitschfeld's third-grade class at Rock Creek Forest Elementary School in Chevy Chase, MD on 22 May 2024.
2. Grauer, J.A., "Advances in Aircraft System Identification at NASA Langley Research Center," invited talk given to the Department of Mechanical & Aerospace Engineering at Princeton University on April 23 2024, as part of their department seminar series. Invitation on the part of Dr. Aimy Wissa. The remainder of the day was spent meeting with students (Aimy's BAM Lab) and faculty (Yinguang Yi, Marcus Haltmark, Howard Stone, Robert Stengel, and Clarence Rowley).
3. Grauer, J.A., "Advances in Aircraft System Identification at NASA Langley Research Center," invited talk given to the Department of Aerospace Engineering at the University of Maryland at College Park, on February 21 2024, as part of the Minta Martin Seminar Series. Invitation on the part of Dr. Umberto Saetti.
4. Grauer, J.A., "System Identification of the X-56A from Flight Test Data — Status Update," Third Aeroelastic Prediction Workshop (AePW-3), AIAA, National Harbor, MD, 21-22 January 2023.

5. Grauer, J.A., "Recent System Identification Research at NASA Langley Research Center," invited talk given to the Mechanics in Aviation conference at Kazimierz Dolny, Poland by the Polish Society of Theoretical and Applied Mechanics on 15 November 2022. Invitation on behalf of Dr. Piotr Lichota.

6. Grauer, J.A., "Recent System Identification Research at NASA Langley Research Center," invited talk given to the Department of Aerospace Engineering at the University of Maryland, College Park, on 30 May 2022, as part of the Aerospace Engineering Seminar Series. Invitation on the part of Dr. Brent Barbee.

7. Grauer, J.A., "Introduction to System Identification using Closed-Loop Data," invited talk given to the Department of Mechanical Engineering at University of Missouri — Kansas City, ME 494 / 5594 Robotic System Identification on 06 May 2021. Invitation on behalf of Dr. Travis Fields.

8. Grauer, J.A., "Modeling for Autonomy", invited talk given to the Department of Mechanical Engineering at Texas A & M University in College Station, TX on 14 November 2019. Invitation on behalf of Dr. James Hubbard.

9. Grauer, J.A., "Recent System Identification Research at NASA Langley Research Center,"invited talk given to the Department of Aerospace and Ocean Engineering at Virginia Tech in Blacksburg, VA on 29 October 2018 as part of their Graduate Seminar Series. Invitation on behalf of Dr. Craig Woolsey.

10. Grauer, J.A., "Real-Time Frequency Response Estimation with Applications,"given as the Dave Ward Memorial Lecture to the Aerospace Control and Guidance Systems Committee, Meeting No. 120, Seattle WA, 1–3 November 2017.

11. Grauer, J.A., "System Identification Concepts and Challenges for Weather Modeling,"given to the ENAE788O class on "Aerospace Technology Solutions for a Changing Planet,"under Dr. James Hubbard, University of Maryland, 11 September 2017.

12. Morelli, E.A., and Grauer, J.A., "Practical Aspects of the Frequency-Domain Approach for Aircraft System Identification," Aerospace Control and Guidance Systems Committee Meeting No. 115, Portland, OR, presentation only, 3–6 March 2015.

13. Grauer, J.A., and Hubbard, J.E., "Ornithopter Flight Dynamics and Control," presentation to the American Helicopter Society, National Capital Section, Arlington VA, 18 March 2009.

14. Grauer, J.A., (Title Forgotten), talk on engineering and mathematics, given to Dr. Joyce Goodson's calculus classes at Owings Mills High School, 2011.

Books and Chapters

1. Grauer, J.A., and Morelli, E.A., "Advances in Aircraft System Identification from Flight Test Data," editors for the special issue / virtual collection in *Journal of Aircraft*, 2023.

2. Grauer, J.A., and Hubbard, J.E., "Flight Dynamics and System Identification for Modern Feedback Control: Avian-Inspired Robots," Chandos, November, 2013.

3. Grauer, J.A., and Hubbard, J.E., "Modeling of Ornithopter Flight Dynamics," (invited) book chapter in "Morphing Aerospace Vehicles and Structures" edited by Valasek, J., April, 2012 (1st edition), pp. 127–149, DOI: 10.2514/4.869037 (2nd edition).

Journal Articles

1. Grauer, J.A., and Morelli, E.A., "Advances in Aircraft System Identification from Flight Test Data: Introduction to the Virtual Collection," *Journal of Aircraft*, Vol. 60, No. 5, September–October, 2023, pp. 1329–1330, DOI: 10.2514/1.C037583.

2. Morelli, E., and Grauer, J.A., "Advances in Aircraft System Identification at NASA Langley Research Center," *Journal of Aircraft*, Vol. 60, No. 5, September–October, 2023, pp. 1354–1370, DOI: 10.2514/1.C037274.

3. Grauer, J.A., "Frequency Response Estimation for Multiple Aircraft Control Loops Using Orthogonal Phase-Optimized Multisine Inputs," MDPI Processes, Vol. 10, No. 4, March, 2022, pp. 1–24, DOI: 10.3390/pr10040619.

4. Grauer, J.A., "Aerodynamic Parameter Estimation Using Reconstructed Turbulence Measurements," *Journal of Aircraft*, Vol. 58, No. 5, September–October, 2021, pp. 1022–1033, DOI: 10.2514/1.C035933.

5. Grauer, J.A., and Boucher, M.J., "Aircraft System Identification from Multisine Inputs and Frequency Responses," *Journal of Guidance, Control, and Dynamics*, Vol. 43, No. 12, December, 2020, pp. 2391–2398, DOI: 10.2514/1.G005131.

6. Morelli, E.A., and Grauer, J.A., "Practical Aspects of Frequency-Domain Approaches for Aircraft System Identification," *Journal of Aircraft*, Vol. 57, No. 2, March–April, 2020, pp. 268–291, DOI: 10.2514/1.C035599.

7. Grauer, J.A., and Boucher, M.J., "Real-Time Estimation of Bare-Airframe Frequency Responses from Closed-Loop Data and Multisine Inputs," *Journal of Guidance, Control, and Dynamics*, Vol. 43, No. 2, February, 2020, pp. 288–298, DOI: 10.2514/1.G004574.

8. Grauer, J.A., and Boucher, M.J., "Identification of Aeroelastic Models for the X-56A Longitudinal Dynamics Using Multisine Inputs and Output Error in the Frequency Domain," *MDPI Aerospace*, Vol. 6, No. 2, Article 24, February, 2019, pp. 1–25, DOI: 10.3390/aerospace6020024.

9. Grauer, J.A., "Random Noise Generation Using Fourier Series," *Journal of Aircraft*, Vol. 55, No. 4, July–August, 2018, pp. 1753–1759, DOI: 10.2514/1.C034616.

10. Grauer, J.A., Morelli, E.A., and Murri, D.G., "Flight-Test Techniques for Quantifying Pitch Rate and Angle-of-Attack Rate Dependencies," *Journal of Aircraft*, Vol. 54, No. 6, November–December, 2017, pp. 2367–2377, DOI: 10.2514/1.C034407.

11. Grauer, J.A., "Real-Time Data Compatibility Analysis using Output-Error Parameter Estimation," *Journal of Aircraft*, Vol. 52, No. 3, May–June, 2015, pp. 940–947, DOI: 10.2514/1.C033182.

12. Wissa, A.A., Grauer, J.A., Guerreiro, N.M., Altenbuchner, C., Hubbard, J.E., Tummala, Y., Frecker, M., and Roberts, R., "Free Flight Testing and Performance Evaluation of a Passively Morphing Ornithopter," *International Journal of Micro Air Vehicles*, Vol. 7, No. 1, March 2015, pp. 21–40, DOI: 10.1260/1756-8293.7.1.21.

13. Grauer, J.A., and Morelli, E.A., "Reply by the Authors to M. Tischler, C. Ivler, and T. Berger, "*Journal of Guidance, Control, and Dynamics*," Vol. 38, No. 3, March, 2015, pp. 549–550, DOI: 10.2514/1.G001090.

14. Grauer, J.A., and Morelli, E.A., "Generic Global Aerodynamic Model for Aircraft," *Journal of Aircraft*, Vol. 52, No. 1, January–February, 2015, pp. 13–20, DOI: 10.2514/1.C032888.

15. Grauer, J.A., and Morelli, E.A., "Method for Real-Time Frequency Response and Uncertainty Estimation," *Journal of Guidance, Control, and Dynamics*, Vol. 37, No. 1, January–February, 2014, pp. 336–343, DOI: 10.2514/1.60795.

16. Grauer, J.A., Ulrich, E.R., Hubbard, J.E., Pines, D.J., and Humbert, J.S., "Testing and System Identification of an Ornithopter in Longitudinal Flight," *Journal of Aircraft*, Vol. 48, No. 2, March–April, 2011, pp. 660–667, DOI: 10.2514/1.C031208.

17. Ulrich, E.R., Faruque, I.A., Grauer, J.A., Pines, D.J., Humbert, J.S., and Hubbard, J.E., "Control Model for Robotic Samara: Dynamics About a Coordinated Helical Turn," *Journal of Guidance, Control, and Dynamics*, Vol. 33, No. 6, November–December, 2010, pp. 1921–1926, DOI: 10.2514/1.50878.

18. Roget, B., Sitaraman, J., Harmon, R.L., Grauer, J.A., Hubbard, J.E., and Humbert, J.S, "Computational Study of Flexible Wing Ornithopter Flight," *Journal of Aircraft*, Vol. 46, No. 6, November–December, 2009, pp. 2016–2031, DOI: 10.2514/1.43187.

19. Grauer, J.A., and Hubbard, J.E., "Multibody Model of an Ornithopter," *Journal of Guidance, Control, and Dynamics*, Vol. 32, No. 5, September–October, 2009, pp. 1675–1679, DOI: 10.2514/1.43177.

20. Grauer, J.A., Conroy, J.K., Hubbard, J.E., Humbert, J.S., and Pines, D.J., "System Identification of a Miniature Helicopter," *Journal of Aircraft*, Vol. 46, No. 4, July–August, 2009, pp. 1260–1269, DOI: 10.2514/1.40561.

21. Grauer, J.A., and Hubbard, J.E., "Inertial Measurements from Flight Data of a Flapping-Wing Ornithopter," *Journal of Guidance, Control, and Dynamics*, Vol. 32, No. 1, January–February, 2009, pp. 326–331, DOI: 10.2514/1.37495.

Technical Reports

1. Schaefer, J., Suh, P., Boucher, M.J., Ouellette, J., Chin, A., Miller, C., Grauer, J.A., Reich, G., Mitchell, R., and Flick, P., "Flying Beyond Flutter with the X-56A Aircraft," NASA TM-20220012337, March 2023.

2. Grauer, J.A., "Estimation of Sideslip Angle and Angle of Attack," NASA Low-Boom Flight Demonstrator Project Engineering Memorandum No. LBFD-EM-TM-4.3-0145, December 2022.

3. Grauer, J.A., "Stability Margins Extracted from High-Fidelity Simulation or Flight Data," NASA Low-Boom Flight Demonstrator Project Engineering Memorandum No. LBFD-EM-TM-4.2-0138, August 2022.

4. Miller, L.J., Grauer, J.A., Pei, J., and Nelson, S.L., "Reconstruction of the Apollo 11 Moon Landing Final Descent Trajectory," NASA TM-20220007267, August 2022.

5. Grauer, J.A., "A Learn-to-Fly Approach for Adaptively Tuning Flight Control Systems," NASA TM-20210021941, October 2021.

6. Grauer, J.A., "In-Flight Turbulence Emulation for Fixed-Wing Aircraft using Equivalent Multisine Excitations," NASA TM-20210020347, September 2021.

7. Grauer, J.A., "Analogy Between the Collatz Conjecture and Sliding Mode Control," NASA TM-20210019810, September 2021.

8. Grauer, J.A., "Dynamic Modeling using Output-Error Parameter Estimation based on Frequency Responses Estimated with Multisine Inputs," NASA TM-2018-220108, November 2018.

9. Grauer, J.A., and Boucher, M.J., "Output Measurement Equations for Flexible Aircraft Flight Dynamics," NASA TM-2018-220102, October 2018.

10. Grauer, J.A., "Position Corrections for Airspeed and Flow Angle Measurements on Fixed-Wing Aircraft," NASA TM-2017-219795, November 2017.

11. Grauer, J.A., "A Comparison of Three Random Number Generators for Aircraft Dynamic Modeling Applications," NASA TM-2017-219612, May 2017.

12. Grauer, J.A., and Morelli, E.A., "Dependence of Dynamic Modeling Accuracy on Sensor Measurements, Mass Properties, and Aircraft Geometry," NASA TM-2013-218056, November 2013.

Conference Papers

1. Ouellette, J. Massey, S.J., Grauer, J.A., Chin, A., Timmermans, H., Aalbers, J., Mkhoyan, I., and Blom, P., "Summary of Results from the Third Aeroelastic Prediction Workshop Flight Test Working Group," *Applied Aerodynamics Conference*, AIAA, Orlando, FL, Paper 2024-0415, 8–12 January 2024, DOI: 10.2514/6.2024-0415.

2. Grauer, J.A., and Waite, J.M., "Design of a Collocation-Based Active Flutter Suppression Control Law for the IAWTM Wind Tunnel Model," *Guidance, Navigation, and Control Conference*, AIAA, Orlando, FL, Paper 2024-2201, 8–12 January 2024, DOI: 10.2514/6.2024-2201.

3. Pei, J., Grauer, J.A., Welstead, J.R., Miller, L.J., and Bae, H.W., "Feasibility Study of a Multi-Tilt-rotor Aircraft as the Artemis Lunar Training Vehicle," *Transformational Flight Conference*, AIAA, National Harbor, MD, Paper 2023-1908, 23–27 January 2023, DOI: 10.2514/6.2023-1908.

4. Grauer, J.A., and Pei, J., "Minimum-Variance Control Allocation Considering Parametric Model Uncertainty," *Guidance, Navigation, and Control Conference*, AIAA, San Diego, CA, Paper 2022-0749, 3–7 January 2022, DOI: 10.2514/6.2022-0134.

5. Grauer, J.A., "A Collection of Resources for Modern Education in Atmospheric Flight Mechanics," *Atmospheric Flight Mechanics Conference*, AIAA, San Diego, CA, Paper 2022-0134, 3–7 January 2022, DOI: 10.2514/6.2022-0134.

6. Campbell, N.H., Grauer, J.A., and Gregory, I.M., "Use of Design of Experiments in Determining Neural Network Architectures for Loss of Control Detection," *Aerospace Conference*, IEEE, Virtual, 6–13 March 2021, DOI: 10.1109/AERO50100.2021.9438231.

7. Grauer, J.A. "Method for Real-Time State Estimation of Structural Modes for an Aeroelastic Wind Tunnel Model," *Atmospheric Flight Mechanics Conference*, AIAA, Virtual, Paper 2021-1643, 11–21 January 2021, DOI: 10.2514/6.2021-1643.

8. Grauer, J.A. "An Interactive MATLAB Program for Fitting Transfer Functions to Frequency Responses," *Atmospheric Flight Mechanics Conference*, AIAA, Virtual, Paper 2021-1426, 11–21 January 2021, DOI: 10.2514/6.2021-1426.

9. Grauer, J.A., Waite, J.M., and Stanford, B.K., "Reduced-Order Aerodynamic Modeling Based on CFD Frequency Responses from Multisine Inputs," *Atmospheric Flight Mechanics Conference*, AIAA, Virtual, Paper 2021-1423, 11–21 January 2021, DOI: 10.2514/6.2021-1423.

10. Campbell, N.H., Grauer, J.A., and Gregory, I.M., "Loss of Control Detection for Commercial Transport Aircraft Using Conditional Variational Autoencoders," *Intelligent Systems Conference*, AIAA, Virtual, Paper 2021-0778, 11–21 January 2021, DOI: 10.2514/6.2021-0778.

11. Waite, J.M., Grauer, J.A., Bartels, R.E., and Stanford, B.K., "Aeroservoelastic Control Law Development for the Integrated Adaptive Wing Technology Maturation Wind-Tunnel Test," *Applied Aerodynamics Conference*, AIAA, Virtual, Paper 2021-0609, 11–21 January 2021, DOI: 10.2514/6.2021-0609.

12. Gregory, I.M, Campbell, N.H., Neogi, N.A., Holbrook, J.B., Bacon, B.J., Moerder, D.D., Simmons, B.M., Acheson, M.J., Murphy, P.C., Britton, T.C., Cook, J.W., and Grauer, J.A., "Intelligent Contingency Management for Urban Air Mobility," *The Dynamic Data Driven Applications Systems (DDDAS) / InfoSymbiotics2020 Conference*, Boston, MA, 2–4 October 2020, DOI: 10.1007/978-3-030-61725-7_5.

13. Grauer, J.A., and Boucher, M.J., "Aircraft System Identification from Multisine Inputs and Frequency Responses," *Atmospheric Flight Mechanics Conference*, AIAA, Orlando, FL, Paper 2020-0287, 6–10 January 2020, DOI: 10.2514/6.2020-0287.

14. Grauer, J.A., "Aerodynamic Parameter Estimation Using Reconstructed Turbulence Measurements," *Atmospheric Flight Mechanics Conference*, AIAA, Orlando, FL, Paper 2020-0288, 6–10 January 2020, DOI: 10.2514/6.2020-0288.

15. Grauer, J.A., and Boucher, M.J., "System Identification of Flexible Aircraft: Lessons Learned from the X-56A Phase 1 Flight Tests," *Atmospheric Flight Mechanics Conference*, AIAA, Orlando, FL, Paper 2020-1017, 6–10 January 2020, DOI: 10.2514/6.2020-1017.

16. Grauer, J.A., and Boucher, M.J., "Identification of Bare-Airframe Dynamics from Closed-Loop Data Using Multisine Inputs and Frequency Responses," *Atmospheric Flight Mechanics Conference*, AIAA, San Diego, CA, Paper 2019-0009, 7–11 January 2019, DOI: 10.2514/6.2019-0009.

17. Grauer, J.A., and Boucher, M.J., "Real-Time System Identification of Flexible Aircraft," *Atmospheric Flight Mechanics Conference*, AIAA, Atlanta, GA, Paper 2018-3155, 25–29 June 2018, DOI: 10.2514/6.2018-3155.

18. Grauer, J.A., "A Learn-To-Fly Approach for Adaptively Tuning Flight Control Systems," *Atmospheric Flight Mechanics Conference*, AIAA, Atlanta, GA, Paper 2018-3312, 25–29 June 2018, DOI: 10.2514/6.2018-3312.

19. Grauer, J.A., and Boucher, M.J., "Frequency-Domain Deconvolution for Aerospace Applications," *Atmospheric Flight Mechanics Conference*, AIAA, Atlanta, GA, Paper 2018-3157, 25–29 June 2018, DOI: 10.2514/6.2018-3157.

20. Morelli, E.A., and Grauer, J.A., "Practical Aspects of the Frequency Domain Approach for Aircraft System Identification," *Atmospheric Flight Mechanics Conference*, AIAA, Atlanta, GA, Paper 2018-3477, 25–29 June 2018, DOI: 10.2514/6.2018-3477.

21. Grauer, J.A., and Boucher, M.J., "Aeroelastic Modeling of X-56A Stiff-Wing Configuration Flight Test Data," *Atmospheric Flight Mechanics Conference*, AIAA, Grapevine, TX, Paper 2017-0699, 9–13 January 2017, DOI: 10.2514/6.2017-0699.

22. Grauer, J.A., Morelli, E.A., and Murri, D., "Flight Test Techniques for Quantifying Pitch Rate and Angle of Attack Rate Dependencies," *Atmospheric Flight Mechanics Conference*, AIAA, Grapevine, TX, Paper 2017-0935, 9–13 January 2017, DOI: 10.2514/6.2017-0935.

23. Grauer, J.A., "Aircraft Fault Detection using Real-Time Frequency Response Estimation," *Guidance, Navigation, and Control Conference*, AIAA, San Diego, CA, (invited) Paper 2016-0372, 4–8 January 2016, DOI: 10.2514/6.2016-0372.

24. Grauer, J.A., and Morelli, E.A., "Parameter Uncertainty for Aircraft Aerodynamic Modeling using Recursive Least Squares," *Atmospheric Flight Mechanics Conference*, AIAA, San Diego, CA, Paper 2016-2009, 4–8 January 2016, DOI: 10.2514/6.2016-2009.

25. Grauer, J.A., and Morelli, E.A., "A New Formulation of the Filter-Error Method for Aerodynamic Parameter Estimation in Turbulence," *Atmospheric Flight Mechanics Conference*, AIAA, Dallas, TX, Paper 2015-2704, 22–26 June 2015, DOI: 10.2514/6.2015-2704.

26. Grauer, J.A., "Real-Time Parameter Estimation using Output Error," *Atmospheric Flight Mechanics Conference*, AIAA, Atlanta, GA, Paper 2014-2556, 16–20 June 2014, DOI: 10.2514/6.2014-2556.

27. Rothaar, P., Murphy, P., Bacon, B., Gregory, I., Grauer, J.A., Busan, R., Croom, M., "NASA Langley Distributed Propulsion VTOL Tilt-Wing Aircraft Testing, Modeling, Simulation, Control, and Flight Test Development," *Aviation Technology, Integration, and Operations Conference*, AIAA, Atlanta, GA, Paper 2014-2999, 16–20 June 2014, DOI: 10.2514/6.2014-2999.

28. Grauer, J.A., and Morelli, E.A., "A Generic Nonlinear Aerodynamic Model for Aircraft," *Atmospheric Flight Mechanics Conference*, AIAA, National Harbor, MD, Paper 2014-0542, 13–17 January 2014, DOI: 10.2514/6.2014-0542.

29. Grauer, J.A., and Martos, B., "Evaluation of Piloted Inputs for Onboard Frequency Response Estimation," *Atmospheric Flight Mechanics Conference*, AIAA, Boston, MA, Paper 2013-4921, 19–22 August 2013, DOI: 10.2514/6.2013-4921.

30. Wissa, A.A., Guerreiro, N.M., Grauer, J.A., Altenbuchner, C., Hubbard, J., and Roberts, R., "Flight Testing of Novel Compliant Spines for Passive Wing Morphing on Ornithopters," *Structures, Structural Dynamics, and Materials Conference*, AIAA/ASME/ASCE/AHS/ASC, Boston, MA, Paper 2013–1516, 8–11 April 2013, DOI: 10.2514/6.2013-1516.

31. Grauer, J.A., and Morelli, E.A., "Dynamic Modeling Accuracy Dependence on Error Measurements, Mass Properties, and Aircraft Geometry," *Aerospace Sciences Meeting*, AIAA, Grapevine, TX, Paper 2013-0949, 7–10 January 2013, DOI: 10.2514/6.2013-949.

32. Grauer, J.A., and Morelli, E.A., "Real-Time Frequency Response Estimation Using Multi-Sine Inputs and Recursive Fourier Transform," *Atmospheric Flight Mechanics Conference*, AIAA, Minneapolis, MN, Paper 2012-4409, 13–16 August 2012, DOI: 10.2514/6.2012-4409.

33. Grauer, J.A., Heeg, J., and Morelli, E.A., "Real-Time Frequency Response Estimation of Joined-Wing SensorCraft Aeroelastic Wind Tunnel Data," *Atmospheric Flight Mechanics Conference*, AIAA, Minneapolis, MN, Paper 2012-4641, 13–16 August 2012, DOI: 10.2514/6.2012-4641.

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