

Curriculum Vitae

MELISSA A GREEN

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Mechanical and Aerospace Engineering
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Date of CV: January 2015

Research interests Biological fluid mechanics, specifically fish swimming; fluid structure interactions; vortex dynamics; turbulence; turbulent combustion

Education/Employment

2012 – Assistant Professor
Syracuse University, Syracuse, NY, USA
Mechanical and Aerospace Engineering

2009 – 2011 NAS/NRC Postdoctoral Research Associate
Naval Research Laboratory, Washington, DC, USA
Laboratory for Computational Physics and Fluid Dynamics
Advisor: Elaine Oran

2009 Postdoctoral Research Associate, Princeton University, Princeton, NJ, USA
Mechanical and Aerospace Engineering
ONR MURI: Toward a Mission-Configurable Stealth Underwater Batoid
Advisor: Alexander J. Smits

2009 Ph.D. Princeton University, Princeton, NJ, USA
Mechanical and Aerospace Engineering
Analysis of bio-inspired propulsors
Advisors: Clarence W. Rowley and Alexander J. Smits

2003 B.S. University of Notre Dame, Notre Dame, IN, USA
Aerospace Engineering

Honors and Awards

2014 Air Force Office of Scientific Research Young Investigator Award

2009 National Research Council Research Associateship

2007 Wu Prize for Excellence (Princeton University School of Engineering and Applied Science)

2004 – 2007 National Science Foundation Graduate Research Fellowship

2006 Larisse Rosentweig Klein Memorial Award (Princeton Mechanical and Aerospace Engineering department)

2005 NSF East Asia Pacific Summer Institute

Teaching experience

Assistant Professor, Syracuse University

- 2015 Spring Dynamics of Mechanical Systems (MAE 321)
- 2014 Fall Aircraft Performance and Dynamics (AEE 427)
- 2014 Spring Fluid Dynamics Measurements (MAE 645)
- 2013 Fall Aircraft Performance and Dynamics (AEE 427)
- 2012 Fall Aircraft Performance and Dynamics (AEE 427)

Current funding

- 2014 1. Air Force Office of Scientific Research Young Investigator Program
Using Lagrangian coherent structures to characterize vortex shedding on bluff bodies in cross-flow
Dates: 8/15/2014 - 8/14/2017
Total award: \$355,160
- 2014 2. Office of Naval Research, Biologically Inspired Underwater Propulsion Program
Lagrangian methods in unsteady propulsion: characterizing vortex wake structure and force production
Dates: 5/15/2014 - 5/14/2017
Total award: \$671,706

Publications

Peer-reviewed journal articles

- 2015 1. Huang, Y. & Green, M. A. *Eulerian and Lagrangian methods for detecting vortex formation and shedding*, Experiments in Fluids, *in preparation*.
- 2014 2. Rockwood, M.P., Loiselle, T. & Green, M. A. *Practical concerns of implementing an LCS analysis with underresolved data*, Chaos, *submitted*.
- 2014 3. Rockwood, M.P. & Green, M. A. *Lagrangian Coherent Structure Analysis of Vortex Shedding in the Wake of a Cylinder*, J. Fluid Mech., (under review).
- 2011 4. Buchholz, J.H.J., Green, M. A., & Smits, A. J. *Scaling the circulation shed by a pitching panel*, J. Fluid Mech., **688**, pp. 591–601.
- 2011 5. Green, M. A. Rowley, C. W., & Smits, A. J. *The unsteady three-dimensional wake produced by a trapezoidal pitching panel*, J. Fluid Mech., **685**, pp. 117–145
- 2010 6. Green, M. A. Rowley, C. W., & Smits, A. J. *Using hyperbolic Lagrangian coherent structures to investigate vortices in bioinspired fluid flows*, Chaos **20**, 017510.
- 2008 7. Green, M. A. & Smits, A. J. *Effects of three-dimensionality on thrust production by a pitching panel*, J. Fluid Mech., **615**, pp. 211–220.
- 2007 8. Green, M. A., Rowley, C. W., & Haller, G. *Detection of Lagrangian coherent structures in three-dimensional turbulence*, J. Fluid Mech. **572**, pp. 111–120.

Conference extended abstracts (peer-reviewed and/or invited)

- 2015 9. Rockwood, M.P. & Green, M. A. *An Analysis of the Unsteady Wake Behind a Circular Cylinder using Lagrangian Coherent Structures*, AIAA Science and Technology Forum 2015, Kissimmee, FL, USA. 5–9 January 2015.
- 2015 10. Huang, Y. & Green, M. A. *Eulerian and Lagrangian methods for detecting vortex formation and shedding*, AIAA Science and Technology Forum 2015, Kissimmee, FL, USA. 5–9 January 2015.
- 2015 11. Rice, T. T. & Green, M. A. *Three dimensional unsteady wake of a trapezoidal pitching panel*, AIAA Science and Technology Forum 2015, Kissimmee, FL, USA. 5–9 January 2015.
- 2014 12. Rockwood, M.P. & Green, M. A. *An Analysis of the Unsteady Wake Behind a Circular Cylinder using Lagrangian Coherent Structures*, AIAA Science and Technology Forum 2014, National Harbor, MD, USA. 13–17 January 2014.
- 2013 13. Green, M. A. *Eulerian and Lagrangian methods for coherent structure analysis in both computational and experimental data*, 51st AIAA Aerospace Sciences Meeting Including the New Horizons Forum and Aerospace Exposition, Grapevine, TX, USA. 7–10 January 2013.
- 2013 14. Rockwood, M.P. & Green, M. A. *An experimental analysis of the unsteady wake behind a circular cylinder using Eulerian and Lagrangian techniques*, 51st AIAA Aerospace Sciences Meeting Including the New Horizons Forum and Aerospace Exposition, Grapevine, TX, USA. 7–10 January 2013.
- 2009 15. Green, M. A., Rowley, C. W., & Smits, A. J. *Three-dimensional wake of a biologically inspired propulsor*, 39th AIAA Fluid Dynamics Conference, San Antonio, TX, USA. 22–25 June 2009.
- 2005 16. Green, M., Parker, K., & Soria, J. *2D PIV of a Pitching Aerofoil*, Fourth Australian Conference on Laser Diagnostics in Fluid Mechanics and Combustion, The University of Adelaide, South Australia, Australia. 7–9 December 2005.

Invited talks

- 2014 Nov Lehigh University, Department of Mechanical Engineering and Mechanics Seminar
- 2014 Oct Illinois Institute of Technology, Department of Mechanical, Materials, and Aerospace Engineering Seminar
- 2014 Oct University of Illinois, Urbana-Champaign, Fluid Mechanics Seminar
- 2014 June US Congress on Theoretical and Applied Mechanics, Session: “Bioflight I: Models (experimental, numerical and theoretical),” East Lansing, MI
- 2014 May Extreme Flows Workshop, Princeton, NJ
- 2014 Mar Johns Hopkins University, Department of Mechanical Engineering Fluid Dynamics Seminar
- 2013 Nov Vanderbilt University, Department of Mechanical Engineering Seminar
- 2013 Nov Frontiers in Fluid Dynamics Research Symposium, San Juan, PR
- 2013 Sep BIRS Workshop 13w5089 Uncovering Transport Barriers in Geophysical Flows
- 2013 Apr University of Buffalo, Department of Mechanical and Aerospace Engineering Seminar
- 2013 Feb Florida State University, Department of Mechanical Engineering Seminar
- 2013 Jan Syracuse University, Department of Mechanical and Aerospace Engineering Seminar
- 2013 Jan AIAA Aerospace Sciences Meeting, Visualization, AMT-10/FD-26: Analysis and Interpretation of Very Large Sets of Fluid Dynamics Data, Grapevine, TX
- 2012 July 9th American Institute of Mathematical Sciences Conference on Dynamical Systems, Special Session 27: Transport Barriers in Dynamical Systems, Orlando, FL

- 2011 May Lorentz Center Workshop: Coherent Structures in Dynamical Systems, Leiden, The Netherlands
- 2011 May Syracuse University, Department of Mechanical and Aerospace Engineering Seminar
- 2010 May 8th American Institute of Mathematical Sciences Conference on Dynamical Systems, Special Session 30: Lagrangian Coherent Structures and Invariant Manifolds: Analysis and Applications, Dresden, Germany
- 2010 Feb Stanford University, Department of Aeronautics and Astronautics Seminar
- 2009 Oct University of Iowa, Department of Mechanical Engineering Seminar
- 2009 Jan California Institute of Technology, Department of Mechanical Engineering Seminar

Non-refereed abstracts and presentations

- 2014 17. Berger, Z. P., King, J. T., & Green, M. A. *Identification of Vortex Breakdown in Bio-Inspired Wakes Using Proper Orthogonal Decomposition*, 67th Annual Meeting of the APS Division of Fluid Dynamics, San Francisco, CA, USA. 23–25 November 2014.
- 2014 18. Huang, Y. & Green, M. A. *Eulerian and Lagrangian methods for vortex tracking in 2D and 3D flows*, 67th Annual Meeting of the APS Division of Fluid Dynamics, San Francisco, CA, USA. 23–25 November 2014.
- 2014 19. Rockwood, M.P. & Green, M. A. *The Effect of Phase Averaging Techniques on Lagrangian Coherent Structures in the Wake of a Circular Cylinder*, 67th Annual Meeting of the APS Division of Fluid Dynamics, San Francisco, CA, USA. 23–25 November 2014.
- 2013 20. Jeter, T. R. & Green, M. A. *Vortical wake evolution and its effect on performance using Lagrangian coherent structures*, 66th Annual Meeting of the APS Division of Fluid Dynamics, Pittsburgh, PA, USA. 24–26 November 2013.
- 2013 21. Rockwood, M.P. & Green, M. A. *A Lagrangian Coherent Structures Analysis of the Unsteady Wake Behind a Circular Cylinder*, 66th Annual Meeting of the APS Division of Fluid Dynamics, Pittsburgh, PA, USA. 24–26 November 2013.
- 2012 22. Green, M. A. *Using LCS to identify vortex shedding on a cylinder in cross-flow*, 65th Annual Meeting of the APS Division of Fluid Dynamics, San Diego, CA, USA. 18–20 November 2012.
- 2012 23. Rockwood, M.P. & Green, M. A. *2D FTLE in 3D flows: The accuracy of using two-dimensional data for Lagrangian analysis in a three-dimensional turbulent channel*, 65th Annual Meeting of the APS Division of Fluid Dynamics, San Diego, CA, USA. 18–20 November 2012.
- 2011 24. Green, M. A., Hamlington, P. E., Poludnenko, A. Y., & Oran, E. S. *Using LCS to study coherent structures in reacting flows*, 64th Annual Meeting of the Division of Fluid Dynamics, Baltimore, MD, USA. 20–22 November 2011.
- 2010 25. Green, M. A., Kaplan, C. R., Oran, E. S. & Boris, J. P. *A dynamic model of human physiology*, 63rd Annual Meeting of the Division of Fluid Dynamics, Long Beach, CA, USA. 21–23 November 2010.
- 2009 26. Green, M. A., Rowley, C. W., & Smits, A. J. *Three-dimensional wake of a biologically-inspired propulsor*, 62nd Annual Meeting of the Division of Fluid Dynamics, Minneapolis, MN, USA. 22–24 November 2009.
- 2009 27. Green, M. A., Rowley, C. W., & Smits, A. J. *Vortex Wake Structure of Rigid Panels with Biologically Inspired Geometry*, 2009 SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, USA. 17–21 May 2009.

- 2008 28. Green, M. A., & Smits, A. J. *LCS analysis of a biologically inspired wake*, 61st Annual Meeting of the Division of Fluid Dynamics, San Antonio, TX, USA. 23–25 November 2008.
- 2007 29. Green, M. A. & Rowley, C. W. *Detection of Lagrangian Coherent Structures in 3D Turbulence*, 2007 SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, USA. 28 May – 1 June 2007.
- 2007 30. Green, M. A., & Smits, A. J. *Wake structure of rigid pitching panels with biologically inspired geometry*, 60th Annual Meeting of the Division of Fluid Dynamics, Salt Lake City, UT, USA. 18–20 November 2007.
- 2006 31. Green, M. A., Rowley, C. W., & Haller, G. *Detection of Lagrangian coherent structures in 3D Turbulence*, 59th Annual Meeting of the Division of Fluid Dynamics, Tampa Bay, FL, USA. 19–21 November 2006.
- 2006 32. Buchholz, J., Green, M. A., & Smits, A. J. *Pressure distribution, thrust performance, and wake structure of a low-aspect ratio pitching panel*, 59th Annual Meeting of the Division of Fluid Dynamics, Tampa Bay, FL, USA. 19–21 November 2006.
- 2005 33. Green, M., Parker, K., & Soria, J. *2D PIV of a pitching airfoil*, 58th Annual Meeting of the Division of Fluid Dynamics, Chicago, IL, USA. 20–22 November 2005.

Other contributions and service

Conference service

- 2016 AIAA Science and Technology Forum, 4–8 January
Co-technical chair, Fluid Dynamics
- 2015 AIAA Aviation, 13–17 January
Assistant Organizer, Fluid Dynamics, Fundamental Flow Phenomena Sub-topic
- 2015 AIAA Science and Technology Forum, 5–9 January
Session chair: FD-01, Bio-inspired Flow
- 2014 APS Division of Fluid Dynamics Annual Meeting, 23–25 November
Session chair: D18, Vortex Dynamics: Flow Induced Vibrations and Interactions
- 2014 AIAA Science and Technology Forum, 13–17 January
Assistant Organizer, Fluid Dynamics, Fundamental Flow Phenomena Sub-topic
Session chair: FD-07: Bioinspired Aerodynamics: Numerical
Session chair: FD-34: Vortex Flows
- 2013 APS Division of Fluid Dynamics Annual Meeting, 24–26 November
Session chair: G12, Vortex Dynamics and Vortex Flows IV
- 2013 AIAA Fluid Dynamics Meeting, 24–27 June
Session chair: FD-04, Flapping-Wing Aerodynamics
- 2013 1000 Island Fluid Dynamics Meeting, 26–28 April
Technical chair, session organizer
- 2012 APS Division of Fluid Dynamics Annual Meeting
Session chair: G28, Swimming Efficiency
- 2012 American Physical Society Division of Fluid Dynamics Annual Meeting
Session chair: E13, Biofluids: Cardiovascular: FSI and CFD

Academic contributions

- 2014 Syracuse Museum of Science and Technology Summer Women's Science Camp, Organizer of "Research Day" on Syracuse University campus
- 2014 Project ENGAGE, Participating faculty
- 2013 – pres. Member, AIAA Fluid Dynamics Technical Committee, Fundamentals of flow phenomena Sub-committee, Chair of Low Reynold Number Discussion Group
- 2012 – pres. Member, American Society of Mechanical Engineers (ASME)
- 2011 – pres. Member, American Institute of Aeronautics and Astronautics (AIAA)
- 2011 – pres. Peer reviewer: Journal of Fluid Mechanics; Chaos, Physics of Fluids; Experiments in Fluids; Physical Review E; AIAA Journal; Experimental Thermal and Fluid Science; Journal of Hydro-environment; Physica D; Journal of Fluids and Structures; Progress in Turbulence; ASME International Gas Turbine Institute Turbo Expo
- 2006 – pres. Member, American Physical Society