

Stephen A. Solovitz, Ph. D.

Assistant Professor
Washington State University Vancouver
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EDUCATION:

- 1/99–4/03 *Stanford University*, Stanford, CA
Ph. D., Mechanical Engineering; Advisor: John K. Eaton.
Dissertation: Experimental Aerodynamics of Mesoscale Trailing-Edge Actuators
- 9/97–1/99 *Stanford University*, Stanford, CA
M. S., Mechanical Engineering.
- 8/93–5/97 *Washington University*, St. Louis, MO
B. S., Mechanical Engineering; B. S., Physics.

TEACHING EXPERIENCE:

8/07–present **Assistant Professor**, Mechanical Engineering
Washington State University Vancouver, Vancouver, WA

- Mech 212: Dynamics
- Mech 301: Thermodynamics
- Mech 303: Fluid Mechanics
- Mech 402: Thermal Systems Design
- Mech 404: Heat Transfer
- Mech 416: Mechanical Systems Design I
- Mech 417: Mechanical Systems Design II
- Mech 441: Fundamentals of Renewable Energy
- Mech 442: Thermal Systems Design
- Mech 515: Advanced Heat Transfer
- Mech 521: Advanced Fluid Dynamics
- Math 540: Applied Mathematics

1/07–5/07 **Adjunct Professor**, Department of Mechanical Engineering
University of Portland, Portland, OR

- ME 436: Thermal Systems Design

1/07–3/07 **Adjunct Professor**, Department of Mechanical and Materials Engineering
Portland State University, Portland, OR

- ME 442/542: Advanced Heat Transfer

RESEARCH EXPERIENCE:

8/07–present **Assistant Professor**, Mechanical Engineering
Washington State University Vancouver, Vancouver, WA

Faculty position in the Mechanical Engineering department, with research studying micro-flow control and enhancement, volcanic jet dynamics, and biomimetics.

10/03–12/06 **Thermal Technologist**, Thermal Systems Laboratory

General Electric Global Research, Niskayuna, NY

Research and development position studying thermal technologies for a range of GE products, applying contemporary modeling tools in concert with advanced experimental techniques, and communicating the results to GE businesses and customers. Primary research focused on the development of a novel micro-channel heat sink with performance better than existing commercial solutions.

2/03-9/03 **Research Associate**, Department of Mechanical and Aerospace Engineering
Princeton University, Princeton, NJ

Post-doctoral research position studying cavity flow oscillations, which can hamper aircraft performance due to effects such as additional noise and drag.

9/97-1/03 **Research Assistant**, Department of Mechanical Engineering
Stanford University, Stanford, CA

Doctoral research position examining the experimental aerodynamics of mesoscale trailing-edge actuators ("microflaps"), which could potentially control aeroelastic vibrations. The study involved multidisciplinary collaboration with aerospace and manufacturing engineers.

5/96-8/97 **Research Assistant**, Experimental Fluid Dynamics Division
McDonnell-Douglas Aerospace/Boeing Company, St. Louis, MO

Two summer internships focused on the use of synthetic jet actuators in microblowing and other flow control methods, which could improve rocket flight control at high angles of attack. Conducted benchtop and wind tunnel experiments, and demonstrated device effectiveness relative to steady jets.

6/95-8/95 **Research Assistant**
Honeywell Technology Center, Minneapolis, MN

Summer internship devoted to the design and construction of a computerized test station for experimentation with highly dense, stable VBL (Vertical Bloch Line) magnetic computer memory.

REFEREED PUBLICATIONS:

- 6/12 Walder, J. S., Iverson, R. M., Logan, M., Godt, J. W., and Solovitz, S. A., "Hydraulics of Embankment-dam Breaching," *Proceedings of the Third International Symposium on Shallow Flows*, Iowa City, IA, June 2012.
- 1/12 Saffaraval, F. and Solovitz, S. A., "Near-exit flow physics of a moderately overpressured jet," *Physics of Fluids*, January 2012 (submitted for publication).
- 1/12 Williams, D. D. and Solovitz, S. A., "Manta Ray Profile Performance Analysis and Comparison with NACA Four-Digit Airfoils," *Journal of Fluids Engineering*, January 2012 (submitted for publication).
- 11/11 Saffaraval, F., Solovitz, S. A., Ogden, D. E., and Mastin, L. G., "Impact of Reduced Near-Field Entrainment of Overpressured Volcanic Jets on Plume Development," *Journal of Geophysical Research*, November 2011 (accepted for publication pending revisions).
- 11/11 Saffaraval, F. and Solovitz, S. A., "Experimental Study of Entrainment Ratio of the Near Exit Region of High-speed Jets," *Proceedings of the 2011 ASME International*

- Mechanical Engineering Congress and Exposition*, Paper #: IMECE2011-63661, Denver, CO, November 2011.
- 10/11 Conder, T. E. and Solovitz, S. A., "Computational Optimization of a Groove-enhanced Mini-channel," *Heat Transfer Engineering*, Vol. 32, No. 10, October 2011, pp. 1-15.
- 9/11 Solovitz, S. A. and Arik, M., "System-level metrics for thermal management technology," *Journal of Thermal Science and Engineering Applications*, Vol. 3, No. 3, September 2011, 031009, pp. 1-12.
- 5/11 Solovitz, S. A. and Mainka, J., "Manifold design for micro-channel cooling with uniform flow distribution," *Journal of Fluids Engineering*, Vol. 133, No. 5, May 2011, 051103, pp. 1-11.
- 5/11 Solovitz, S. A., Mastin, L. G., and Saffaraval, F., "Experimental Study of Near-Field Entrainment of Moderately Overpressured Jets," *Journal of Fluids Engineering*, Vol. 133, No. 5, May 2011, 051304, pp. 1-12.
- 11/10 Jokar, A. and Solovitz, S. A., "Applied Engineering Research in Developing a Thermo/Fluids Curriculum," *Proceedings of the 2010 ASME International Mechanical Engineering Congress and Exposition*, Paper #: IMECE2010-37001, Vancouver, BC, November 2010.
- 6/10 Solovitz, S. A. and Arik, M., "Heat sink metrics for high-performance cooling methodologies," *Proceedings of the iTherm 2010 Conference*, Las Vegas, NV, June 2010.
- 5/10 Stevanovic, L. D., Pautsch, A., Beaupre, R. A., Gowda, A., Sabate, J., and Solovitz, S. A., "Power Electronics Module with Integral Microchannel Heatsink," *Proceedings of the 2010 Power Conversion Intelligent Motion Meeting*, Nuremberg, Germany, May 2010.
- 3/10 Solovitz, S. A. and Conder, T. E., "Flow and Thermal Investigation of a Groove-enhanced Mini-channel Application," *Journal of Thermal Science and Engineering Applications*, Vol. 2, No. 1, March 2010, 011008, pp. 1-11.
- 2/10 Stevanovic, L. D., Pautsch, A., Beaupre, R. A., Gowda, A., and Solovitz, S. A., "Integral Micro-channel Liquid Cooling for Power Electronics," *Proceedings of the 2010 Applied Power Electronics Conference*, Palm Springs, CA, February 2010.
- 10/09 Solovitz, S. A. and Mastin, L. G., "Experimental Study of Near-Field Air Entrainment by Subsonic Volcanic Jets," *Journal of Geophysical Research*, Vol. 114, B10203, doi:10.1029/2009JB006298, 2009.
- 9/09 Solovitz, S. A. and Jokar, A., "Micro-particle image velocimetry visualization of water flow in a complex micro-heat exchanger," *Journal of Flow Visualization and Image Processing*, Vol. 16, No. 3, 2009, pp. 221-236.
- 11/08 Solovitz, S. A. and T. E. Conder, "Integral Micro-channel Packages for Enhanced Thermal Performance," *Proceedings of the 2008 ASME International Mechanical Engineering Congress and Exposition*, Boston, MA, November 2008.
- 6/08 Solovitz, S. A., "Computational Study of Grooved Micro-channel Enhancements," *Proceedings of the Sixth International ASME Conference on Nanochannels, Microchannels and Minichannels*, Darmstadt, Germany, June 2008.
- 11/06 Solovitz, S. A., Stevanovic, L. D., and Beaupre, R. A., "Microchannels Take Heatsinks to the Next Level," *Power Electronics Technology*, November 2006, pp. 14-20 (cover article).
- 5/06 Stevanovic, L., Solovitz, S., and Beaupre, R., "Advanced Power Module with Integrated Microchannel Cooling," *Proceedings of the 2006 ASME Electric Machines Technology Symposium*, Philadelphia, PA, May 2006.
- 3/06 Solovitz, S. A., Stevanovic, L. D., and Beaupre, R. A., "Micro-channel Thermal Management of High Power Devices," *Proceedings of the 2006 Applied Power Electronics Conference*, Dallas, TX, March 2006.

- 9/04 Solovitz, S. A. and Eaton, J. K., "Dynamic Flow Response Due to Motion of Partial-Span Gurney-Type Flaps," *AIAA Journal*, Volume 42, Number 9, September 2004, pp. 1729-1736.
- 8/04 Solovitz, S. A. and Eaton, J. K., "Spanwise Response Variation for Partial-Span Gurney-Type Flaps," *AIAA Journal*, Volume 42, Number 8, August 2004, pp. 1640-1643.
- 1/03 Solovitz, S. A., Experimental Aerodynamics of Mesoscale Trailing-Edge Actuators, Ph.D. Thesis, Department of Mechanical Engineering, Stanford University, Stanford, CA, December 2002.
- 12/02 Solovitz, S. A. and Eaton, J. K., "Experimental Aerodynamics of Mesoscale Trailing-Edge Actuators," *AIAA Journal*, Volume 40, Number 12, December 2002, pp. 2538-2540.
- 7/99 Solovitz, S. A. and Eaton, J. K., "Aeroelastic Control Using Redundant Microactuators," FEDSM99-7185, Proceedings of the 3rd ASME/JSME Joint Fluids Engineering Conference, San Francisco, CA, July 1999.

ADDITIONAL REFEREED CONFERENCES:

- 12/11 Solovitz, S. A., Saffaraval, F., Ogden, D. E., and Mastin, L. G., "Impact of Near-Exit Entrainment on Plume Development," *Proceedings of the 2011 AGU Fall Meeting*, San Francisco, CA, Abstract V41E-06, December 2011.
- 12/10 Saffaraval, F., Solovitz, S. A. and Mastin, L. G., "Examination of Near-field Entrainment of High-speed Jets," *Proceedings of the 2010 AGU Fall Meeting*, San Francisco, CA, Abstract V13C-2379, December 2010.
- 11/09 Conder, T. E. and Solovitz, S. A., "Thermal Enhancement of a Grooved Milli-channel Heat Sink," *2009 ASME International Mechanical Engineering Congress and Exposition*, Orlando, FL, November 2009.
- 10/09 Solovitz, S. A., Mastin, L. G. and Saffaraval, F., "Experimental Investigation of Near-Vent Entrainment for Underexpanded Jets," *2009 Geophysical Society of America Conference*, Portland, OR, October 2009.
- 9/09 Solovitz, S., Jokar, A., and Martinsen, R., "Micro-PIV of a Complex Microchannel Cooler for High-Power Semiconductor Diode Lasers," *Micro Nano Breakthrough Conference*, Portland, OR, September 2009, poster.
- 12/08 Mastin, L. G. and Solovitz, S. A., "Air entrainment and the dynamics of volcanic jets and plumes," *EOS Trans. AGU*, 89(53), Fall Meet. Suppl., Abstract V34A-05, December 2008.
- 9/08 Conder, T. E. and Solovitz, S. A., "Heat Transfer using Grooves in Micro-channels," *Micro Nano Breakthrough Conference*, Vancouver, WA, September 2008, poster.
- 11/03 Solovitz, S. A. and Rowley, C. W., "Excitation of Cavity Oscillations through Random and Periodic Forcing," *American Physical Society*, 56th Annual Meeting of the Division of Fluid Dynamics Conference, East Rutherford, NJ, November 2003.
- 11/03 Eaton, J. K. and Solovitz, S. A., "Transient Flow Response due to Microflap Actuation," *American Physical Society*, 56th Annual Meeting of the Division of Fluid Dynamics Conference, East Rutherford, NJ, November 2003.
- 11/01 Solovitz, S. A. and Eaton, J. K., "Experimental Aerodynamics of Mesoscale Trailing-Edge Actuators," *American Physical Society*, 54th Annual Meeting of the Division of Fluid Dynamics Conference, San Diego, CA, November 2001.

INVITED PRESENTATIONS:

- 4/11 Mechanical and Materials Engineering Departmental Seminar, Portland State University, Portland, OR
- 5/10 Mechanical and Materials Engineering Departmental Seminar, Portland State University, Portland, OR
- 5/09 Eaton Research Group Seminar, Stanford University, Stanford, CA

- 12/08 Energy Conversion Advanced Technology Seminar, General Electric Global Research, Niskayuna, NY
- 6/08 Energy Propulsion Technologies Seminar, General Electric Global Research, Munich, Germany.
- 4/08 Mechanical and Materials Engineering Departmental Seminar, Washington State University, Pullman, WA
- 3/08 Engineering and Computer Science Departmental Seminar, Washington State University Vancouver, Vancouver, WA
- 11/07 U.S.G.S. Cascade Volcanoes Observatory Seminar, Vancouver, WA
- 5/07 Mechanical and Materials Engineering Departmental Seminar, Portland State University, Portland, OR

PATENTS:

- 11/11 US 20080041574 (A1), "Cooling systems employing fluidic jets, methods for their use and methods for cooling," General Electric Company, Arik, M., Wetzel, T. G., and Solovitz, S. A, November 2011.
- 6/11 US 7969734 (B2), "Unique cooling scheme for advanced thermal management of high flux electronics," General Electric Company, Arik, M., Balan, C., Wetzel, T. G., Solovitz, S. A., Byrd, C. M., and Weaver, S. E., June 2011.
- 10/10 US 7817422 (B2), "Heat sink and cooling and packaging stack for press-packages," General Electric Company, Gunturi, S. S., Balasubramaniam, M., Mallina, R. V., Beaupre, R.A., Yan, L., Zhang, R. S., Stevanovic, L.D., Pautsch, A. G., and Solovitz, S. A., October 2010.
- 5/10 European patent, "Double side cooled power module with power overlay," General Electric Company, Beaupre, R.A., Gowda, A., Stevanovic, L.D., and Solovitz, S., May 2010.
- 3/10 European patent, "Advanced and Integrated Cooling for Press-Packages," Zhang, R., Beaupre, R.A., Mallina, R., Gowda, A., Yan, L., Stevanovic, L.D., Morley, P., and Solovitz, S., March 2010.
- 4/08 US 7353859 (B2), "Heat sink with microchannel cooling for power devices," General Electric Company, Stevanovic, L. D. and Solovitz, S. A, April 2008.
- 4/07 US 20070089485, "Method, sensor and system for measuring a lower heating value and a wobbe index of a gaseous fuel," General Electric Company, Antel, W. J., Nirmalan, N. V., Solovitz, S. A., Vats, N., Dey, S., Orenstein, R. M., Moorman, M., and Manginell, R. P., April 2007.

TECHNICAL ACHIEVEMENTS:

- 2010 ASME Diversity Action Grant, WSU Vancouver
- 2009-present SAE Advisor, WSU Vancouver
ASME Advisor, WSU Vancouver
- 2006 *GE Publication Award*, EPT, GE Global Research: Ten GE GRC publications
- 2005 *Management Award*, TSL, GE Global Research:
Outstanding efforts on the HDHTPC micro-channel program
Night on the Town Award, TSL, GE Global Research:
Outstanding contributions on the ARL micro-channel heat transfer project
Best New Technology, EPST Organization, GE Global Research:
MEP High Density Power Conversion Team
Bronze Patent Award, GE Global Research
- 2004 *Management Award*, TSL, GE Global Research:
Thermal leadership on the Electric Starter/Generator program
Six Sigma Green Belt

- 1997-2000 *Stanford Graduate Fellow*, equivalent of NSF fellowship
 1997 *Outstanding Mechanical Engineering Senior*, Washington University
 1995-present *Pi Tau Sigma*, Mechanical Engineering Honor Society
 President of Washington University chapter, 1995-1996.
 1994-present *Tau Beta Pi*, Engineering Honor Society

OTHER ACHIEVEMENTS:

- 2006 *Night on the Town Award*, EPT, GE Global Research:
 Outstanding effort in planning EPT Offsite event
 2005 *Lead Organizer*, 3rd Annual GE Thermal Management of Electronics Symposium
3rd Place in Division, 25th Annual Harry Chapin Memorial Race Against Hunger
 2004 *Night on the Town Award*, TSL, GE Global Research:
 Organization of 2nd Annual GE Thermal Management of Electronics Symposium
Finisher, Mohawk-Hudson River Marathon
 2001 *Mellophones' Section Leader*, Leland Stanford Junior University Marching Band,
 Awarded Best Section

PROFESSIONAL AFFILIATIONS:

- ASME
 APS
 IEEE
 SAE
 AUVSI
 Tau Beta Pi
 Pi Tau Sigma
 Golden Key Honor Society

OTHER PROFESSIONAL SERVICE:

- Member, 2011 WSU Vancouver Mechanical Engineering Graduate Studies Committee
 Member, 2011 WSU CEA Assessment Committee
 Advisor, 2010 WSU Vancouver Entry to ASME Human-powered Vehicle Competition
 Technical Advisor, 2010 MESA Wind Power Challenge
 Advisor, 2009 WSU Vancouver Entry to SAE Aero Design Competition
 Session Chair, 2008 ASME International Mechanical Engineering Conference and Exhibition, Micro-fluidics
 Session Chair, 2005 IEEE International Electronics Packaging Symposium, Thermal Management
 Reviewer for NSF Petrology and Geochemistry Program
 Reviewer for "Experiments in Fluids" journal
 Reviewer for "Journal of Bionic Engineering" journal
 Reviewer for "IEEE Transactions on Components and Packaging Technologies" journal
 Reviewer for "ASME Journal of Thermal Science and Engineering Applications" journal
 Reviewer for "Journal of Electronics Packaging" journal
 Reviewer for "Journal of Heat Transfer" journal
 Reviewer for "Progress in Computational Fluid Dynamics" journal
 Reviewer for "Oil & Gas Science and Technology" journal
 Reviewer for "International Journal of Thermal Sciences" journal
 Reviewer for ASME IMECE conference
 Reviewer for ASME/IEEE iTherm conference
 Reviewer for ASME Heat Transfer conference

Reviewer for AIAA Fluid Dynamics conference
Reviewer for ASEE conference

COMPUTER SKILLS

Matlab, LabVIEW, ANSYS, Icepak, ICEM, CFX, Fluent, Flowlab, Minitab, Autocad, Pro/E, UG, Fortran 90/95, C, Microsoft Windows, Macintosh OS X, UNIX, Microsoft Office, LaTeX, TecPlot

LABORATORY SKILLS

PIV, Micro-PIV, IR thermography, Aerodynamic loads measurements, Pitot-probe measurements, Static and dynamic pressure profiles, Wake drag surveys, Thermocouple measurements, Hot-wire anemometry.

ACTIVITIES:

Musical performance (Guitar, French horn, Mellophone, Vocal), Hiking, Jogging, Dancing, Games, Baseball