

Thomas L. Acker, Ph.D.

Director, Institute for Sustainable Energy Solutions
Professor of Mechanical Engineering
Northern Arizona University
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EDUCATION:

Ph.D., Mechanical Engineering, Colorado State University, December 1995
Dissertation Title: Analysis of Hub Baffles in Liquid Rocket Combustion Instability
M.S., Mechanical Engineering, Colorado State University, May 1990
Thesis Title: Prediction of Acoustic Absorber Performance in Liquid Propellant Rocket Engines
B.S., Engineering Science, Colorado State University, May 1987

Areas of Expertise:

Wind and Solar Integration in Power Systems	Renewable Energy Public Outreach
Solar and Wind Resource Variability	Thermal-Fluid System Analysis
Wind Flow Modeling and Assessment	Renewable Energy Systems
Combustion-Driven Acoustic Instabilities	Aerodynamics and Fluid Modeling

PROFESSIONAL EXPERIENCE:

Northern Arizona University - Department of Mechanical Engineering, 8/96-present.

Director, NAU Institute for Sustainable Energy Solutions, 2011 – present

Full Professor of Mechanical Engineering, 2009 – present

Associate Professor of Mechanical Engineering, 2002 – 2009

Assistant Professor of Mechanical Engineering, 1996 – 2002

Hired as a professor in the area of thermal sciences. Responsible for teaching courses in Renewable and Wind Energy, Fluid Mechanics, Aerodynamics, Gas Dynamics, Combustion, Thermodynamics, and Energy Systems. Areas of research include renewable energy systems, grid integration or renewable energy, aerodynamics, combustion instabilities, and high temperature gas dynamics.

National Renewable Energy Laboratory, Golden, Colorado. 9/03 – 10/10.

Contractor, 2004-2011, Operating Agent for IEA Wind Task 24

Sabbatical Fellow, 2003- 2004 Academic Year; Studied the feasibility and impacts of integrating wind electric and hydro electric generation resources on the utility transmission grid.

Faculty Fellowship, Summer 1997; Performed research pertaining to the analysis of dynamic stall on wind-turbine blades. Studied current analytical models of dynamic stall and experimental data from an actual turbine rotor that demonstrate dynamic stall.

National Center for Atmospheric Research, Boulder, Colorado, 7/95 - 8/96.

Software Engineer: Responsible for implementing modifications to the component models of an atmospheric global circulation model run on Cray and IBM supercomputers, to incorporate new capabilities, numerical approximations, and physical parameterizations.

Combustion Systems Analysts of Colorado, Livermore, Colorado, 1991, 1995.

Consulting Engineer: Hired as a consultant to assist in modifying and enhancing computer codes for predicting liquid rocket engine acoustic combustion stability. Contract work funded by Aerojet-GenCorp and NASA.

Electric Propulsion Laboratory, Tehachapi, California, 1990.

Research Engineer: Performed experimental and analytical investigations into the operation and performance of advanced electric rocket designs; special focus on hydrogen arcjet thrusters and an innovative electrostatic plasma accelerator.

PROFESSIONAL ACTIVITIES:

- President, Board of Directors, Southwest Renewable Energy Institute, 2010 - present
- Member Journal Editorial Board, *Wind Engineering*, 2007 – present
- Reviewer: *Wind Energy*, *Wind Engineering*, *J. of Solar Energy Engr*, *J. of Heat Transfer*, *Hydro Review*, *Renewable Energy*, *Aerospace Science & Technology*
- Member ASME, AWEA, ASES, ASHRAE, ASEE, AIAA, IEEE, UVIG
- Member, Governor's Solar Energy Advisory Council, AZ Department of Commerce (2000-2003)
- Master's students advised: 22
- Cumulative research funding awarded at NAU: \$5,997,000 (through 10-13)

AWARDS:

- Engineering Science Distinguished Alumni Award, Colorado State University, 2011
- Professor of the Year Award, College of Engineering and Technology, 2001-02
- Mechanical Engineering Professor of the Year, Northern Arizona University, 2000-01
- Outstanding Mechanical Engineering Graduate Student, Awarded ASME, 1992
- Awarded the Colorado Graduate Fellowship, 1991
- Awarded the Rockwell International Graduate Fellowship, 1989
- Outstanding Student Achievement Award, Awarded by the AIAA, 1987

RECENT PUBLICATIONS

- Acker, T.L., Atwater C. & D. H. Smith (2013), "Energy Inefficiency In Industrial Agriculture: You Are What You Eat," *Energy Sources, Part B: Economics, Planning, and Policy*, 8:4, 420-430, DOI: 10.1080/15567249.2010.485168.
- Acker, T, Robitaille, A., Holttinen, H., Piekutowski, M. and J.O.G. Tande (2012) "Integration of Wind and Hydropower Systems: Results of IEA Wind Task 24," *Wind Engineering*, Vol. 36, No. 1, pgs. 1-18, special issue on wind and hydropower integration.
- Acker, T, Buechler, J., Knitter, K., Conway, K., and R. Noteboom (2012) "Wind Integration Impacts on Hydropower and System Balancing Operations in the Grant County PUD," *Wind Engineering*, Vol. 36, No. 1, pgs. 81-96, special issue on wind and hydropower integration.
- Acker, T.L., (2012) "Special Editorial: IEA Task 24 on Wind and Hydropower Integration," *Wind Engineering*, Vol. 4, No. 30, pgs. iii-v.
- Acker, T., and Pete, C. (2012) "Western Wind and Solar Integration Study: Hydropower Analysis," NREL/SP-5500-53098, prepared for the National Renewable Energy Laboratory under DE-AC36-08GO28308, 194 pages, March 2012.
- Acker, T. (2011). *IEA Wind Task 24 Integration of Wind and Hydropower Systems; Volume 1: Issues, Impacts, and Economics of Wind and Hydropower Integration*. 167 pp.; NREL Report No. TP-5000-50181.
- Acker, T. (2011). *IEA Wind Task 24 Integration of Wind and Hydropower Systems; Volume 2: Participant Case Studies*. 177 pp.; NREL Report No. TP-5000-50182.
- Acker, T.L, Pete, C.M., Bielecki, M., Kemper, J., Boyce, H., and DeHaan, J. (2011), "The Hydroelectric Industry's Role in Integrating Wind Energy," *Hydro Review*, Volume 30, Issue No. 5, pgs 68-76.
- Acker, T.L, (2011) "Hydroelectric Industry's Role in Integrating Wind Energy," prepared for the Centre for Energy Advancement through Technology Innovation, CEATI Report No. T102700-0371, Feb.
- Dennis, C.M., Walish, R.C., Pacini, H.M., Chisholm, T.A, and Acker, T.L, (2011) "Improving Hydrogeneration Representation in a Production Cost Model Used for Long-Term Transmission Studies in the Western Interconnection," Proceedings of the 2011 IEEE Power Systems Conference and Exposition, March 20-23, 2011, Phoenix, AZ.
- Bielecki, M.F., Kemper, J.J., and Acker, T.L (2010) "A Methodology for Comprehensive Characterization of Errors in Wind Power Forecasting," ES2010-90381, Proceedings of the ASME 2010 4th International Conference on Energy Sustainability, Phoenix, Arizona, May 2010.
- Kemper, J.J., Bielecki, M.F., and Acker, T.L (2010) "Modeling of Wind Power Production Forecast Errors for Wind Integration Studies," ES2010-90441, Proceedings of the ASME 2010 4th Int'l Conference on Energy Sustainability, Phoenix, Arizona, May 2010.