

Tim Brower

Education

- Ph.D. Space Fluid Mechanics, Civil Engineering Department, Colorado State University, 1997
- MS Mechanical Engineering, Montana State University
- BS General Engineering, Idaho State University

Professional Recognition

- ASEE Recognition of Service as Program Chair, 2008 Annual Conference, Engineering Technology Division
- ASEE Recognition of Service as Program Chair, 2006 CIEC
- ASME International, Student Section Advisor Award (1999)
- OIT Outstanding Club Advisor Award (1999/2000)
- OIT Faculty Achievement Award (teacher of the year), (2000)
- OIT Certificate of Recognition for summer activities (2000/01)
- OIT Student Affairs Most Valuable Partner Award (2001)
- ASEE Engineering Technology Division Best Presenter Award for CIEC Conference (2001)

Research Interests

- Engineering education
- Fluid mechanics

Selected Publications (presentations)

- Brower, T., "Systems Engineering in Undergraduate Education: An Activities, project, problem-Based Learning Approach," AC 2009-261, 2009 ASEE Annual Conference & Exposition, Austin, TX, June 2009.
- Brower, T., "Linking High School Pre-Engineering with University E and ET Programs," to be presented and published at the 2009 ASEE Conference for Industry and Education Collaboration, Orlando, FL, Feb 2009.
- Brower, T., "Thinking Globally & Acting Locally in Oregon," The Oregon Science Teacher, Jan. 2008.
- Brower, T. and Gummer, E. invited presentations: "Evaluation Model of PLTW" and "Teacher Professional Development Model," US Dept. of Ed. Mathematics and Science Regional Conference, San Francisco, CA, Feb. 14, 15, 2008.

- Brower, T., Grimsley, R., and Newberry, P., "STEM is Not Just a Four Individually Lettered Word," AC 2007-884, 2007 ASEE Annual Conference & Exposition, Honolulu, Hawaii, June 2007.
- Fitzsimmons, V. and Brower, T., "An Evaluation Model for Senior Project Collaborations," Session ETD 426, 2007 ASEE Conference for Industry and Education Collaboration, Palm Springs, CA, Feb 2007.
- Brower, T., "STEM is Not a Four Individually Lettered Word," The Oregon Science Teacher, Sept. 2006.
- Brower, T., "Can Engineering and Engineering Technology Programs Reside within the Same Academic Department?," 2006 ASEE Annual Conference & Exposition, Chicago, IL, June 2006.
- Brower, T., "Titan Launch Vehicle: A Ground Test History," AIAA Journal of Spacecraft and Rockets, Vol. 43, No. 1, pp 147-160, September, Jan.-Feb. 2006.

Curriculum Vitae

Tim L. Brower
September 2009

Office Address

Director
MSC/CU-Boulder Mechanical Engineering Partnership Program
Mesa State College
Grand Junction, CO 81501
Office Phone: (970) 773-0397
E-mail: timothy.brower@Colorado.edu

Home Address

682 29 $\frac{1}{2}$ Road
Grand Junction, Colorado 81504
Phone: (970) 773-0397

Current and Recent Positions

Director, CU-Mesa State College Engineering Partnership (August 2009 - present)
Professor of Manufacturing & Mechanical Engineering & Technology, Oregon Institute of Technology (1998 - Aug. 2009)
Director, Project Lead The Way - Oregon. Responsible for program direction, funding, recruitment, and teaching. Currently in 18 high schools, 11 middle schools and 2 community colleges within Oregon (2005 - current)
Director, American Society of Engineering Educators, Engineering Technology Council, (2008 - 2010)
Department Chair, Manufacturing & Mechanical Engineering & Technology, Oregon Institute of Technology (2002 - 08)
Affiliate Director at OIT, Oregon Space Grant (2000-08)
Associate Director for the State of Oregon, Oregon Space Grant (2005-07)

Educational Background

Ph.D. in Space Fluid Mechanics, Civil Engineering Department, Colorado State University. Dissertation entitled "Flow about a Droplet in Reduced Gravity," performed under the direction of the late Dr. Willy Sadeh (1932-1997), Professor of Space Engineering and Fluid Mechanics. An interdisciplinary approach to low gravity fluids that included aspects of the aerospace, mechanical and civil curricula. An appointment as a NASA Research Fellow from 1992-1995 allowed for a purely theoretical research topic concerning the motion of a droplet under the combined influence of gravity and a thermally induced

surface tension gradient. Course emphasis included turbulence, hydrodynamics, theoretical mechanics, experimental methods, and finite elements.

MS in Mechanical Engineering, Montana State University. Thesis entitled "Transition to Turbulence in Non-Equilibrium Mixing Layers," performed under the tutelage of Dr. Anthony Demetriades, Professor of Mechanical Engineering. An experimental investigation of the fundamental mixing characteristics of two supersonic streams. Studies included steady-state and fluctuating pressure measurements as well as turbulence detection using hot film and hot wire anemometry.

BS in General Engineering, Idaho State University. Graduated with high honors, GPA 3.81/4.00. Program of study provided a broad background in fluid mechanics, heat transfer, physical modeling, structures, materials, and electronics. A minor in mathematics was granted.

Academic Experience

Oregon Institute of Technology, Klamath Falls, OR, Professor (past 11 yrs).

Tenure received 2003. 6 years as Department Chair. Teaching duties include undergraduate courses in Biomedical Engineering, Fluid Mechanics, Thermodynamics, Renewable Energy, Gas Dynamics, Fluid Power Systems, Vibrations, Statics, Strength of Materials, Fuel Cells, Vacuum Technology, and Senior Projects. Trained ABET Program Evaluator.

Colorado State University, Fort Collins, CO, Assistant Professor/ Research Scientist (2 yrs). Responsibilities included approximately 2/3 research and 1/3 teaching. Research consisted of a \$110k per year contract with the Lockheed Martin Corporation to consult and perform analyses on problems of mutual interest relating to the Titan, Atlas, EELV and LMLV programs. Effort to develop an externally funded research program in fluid mechanics and aerodynamics was ongoing. Work to integrate the technical aspects of wind tunnel modeling and aerospace vehicle design for the company. Normal teaching duties included undergraduate courses in Mechanics of Materials (lecture and laboratory) and Engineering Mechanics. Guest lecturer in several graduate level courses with subjects on perturbation methods and computational fluid mechanics applied to droplet motion.

NASA Graduate Researchers Program. Competitive research proposal submitted to the NASA Office of Space Science and Applications resulted in a three year funded fellowship to conduct theoretical investigations of immiscible fluid separation in low gravity environments.

AIMS Community College, Greeley, CO, Visiting Professor part-time.

Instructor for courses in calculus based physics, algebra based physics, physics laboratory, calculus and meteorology.

Embry-Riddle Aeronautical University, Warren AFB Resident Center, Adjunct Faculty. Professor in the graduate Space Studies Specialization and the Master of Science in Technical Management options.

Industrial Experience

Lockheed Martin Corporation, Denver, CO, Aerodynamics/Aerophysics/Systems Engineer (12 yrs, last 6 concurrent with Ph.D.). Lead aero-engineer for the analysis and design of launch vehicles encompassing all steady and dynamic subsonic and supersonic flight regimes.

- Research projects included state-of-the-art 3-body aerodynamic and high angle-of-attack aerodynamic studies.
- Technical management of multi-million dollar projects related to the design of launch vehicles. Coordination of technical interchange between Lockheed Martin management, the Air Force Space Command, the Aerospace Corp., and sub-contractors McDonnell Douglas Corp., Hercules (Alliant Technologies), Hughes Corporation, TRW and Boeing.
- Lead engineer for several experimental wind tunnel investigations conducted at the Arnold Engineering and Development Center. Various on-site experimental studies concerning air flow contamination and honeycomb venting. Conducted three experimental investigations off-site at McDonnell Douglas, Huntington Beach addressing the flow of air through various venting configurations.

AVCO Systems Division, Wilmington, MA, Staff Mechanical Engineer (2 yrs). Responsibilities included heat transfer and pressure analyses and designs of wind tunnel models, full-scale high-speed reentry vehicles and lab test articles.

Bonneville Power Administration, Portland, OR, Mechanical Engineer (3 yrs, last 2 concurrent with MS). Responsibilities included computer modeling of residential and business buildings and energy systems. Programs used to forecast energy consumption throughout the Pacific Northwest Region for the next decade. Computer models developed were later used as a basis for future energy modeling software.

Academic Publications and Presentations

2009 Brower, T., "Systems Engineering in Undergraduate Education: An Activities, project, problem-Based Learning Approach," AC 2009-261, 2009 ASEE Annual Conference & Exposition, Austin, TX, June.

2009 Brower, T., "Linking High School Pre-Engineering with University E and ET Programs," to be presented and published at the 2009 ASEE Conference for Industry and Education Collaboration, Orlando, FL, Feb.

2008 Brower, T., "Thinking Globally & Acting Locally in Oregon," The Oregon Science Teacher, Jan. 2008.

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- 2006 Brower, T., "STEM is Not a Four Individually Lettered Word," *The Oregon Science Teacher*, Sept. 2006.
- 2006 Brower, T., "Can Engineering and Engineering Technology Programs Reside within the Same Academic Department?," 2006 ASEE Annual Conference & Exposition, Chicago, IL, June.
- 2006 Brower, T., "Titan Launch Vehicle: A Ground Test History," *AIAA Journal of Spacecraft and Rockets*, Vol. 43, No. 1, September, Jan.-Feb., pp 147-160.
- 2004 Brower, T., "Titan Launch Vehicle: A Ground Test History," AIAA 2004-2488, 24th AIAA Aerodynamic Measurement Technology and Ground Testing Conference, Portland, Oregon, 28 June - 1 July.
- 2002 Brower, T., "Technology Space Camp," 2002 ASEE Annual Conference & Exposition, Montreal, Canada, June.
- 2001 Brower, T. and Cornachione, H., "Women in Engineering Technology: Where Are They?" Session 3249, 2001 ASEE Annual Conference & Exposition, Albuquerque, N.M., June.
- 2001 Brower, T. and Hefty, M. "A Mechanical Engineering Technology Senior Project Aboard NASA's Weightless Wonder," ASEE 2001 CIEC Conference for Industry and Education Collaboration, San Diego CA, Jan 30 - Feb 2.
- 1998 Brower, T., "Aerodynamic Wind Tunnel Test History," TM-98-32621-006, Colorado State University Technical Report, Fort Collins, CO, February.
- 1998 Brower, T., "Bubble Flow in Reduced Gravity," Proceedings of the Space Technology and Applications International Forum 1998, 2nd Conference on Applications of Thermophysics in Microgravity, Paper No. 175, Albuquerque, NM, January 25-29.
- 1997 Brower, T., "Aerodynamic Airload Analysis for the Atlas IIAR Launch Vehicle," TM-98-32621-005, Colorado State University Technical Report, Fort Collins, CO, November.
- 1997 Brower, T., "Aerodynamic Coefficient Analysis for the Atlas IIAR Launch Vehicle," TM-97-32621-004, Colorado State University Technical Report, Fort Collins, CO, September.
- 1997 Brower, T. and Sadeh, W., "Thermocapillary Drift of a Droplet in Reduced Gravity," IAF-97-J.1.03, 48th International Astronautical Congress, Turin, Italy, October 6-10.

- 1997 Brower, T., "Titan IV Type I/II Core Aerodynamics During O/I Staging," TM-97-32620-003, Colorado State University Technical Report, Fort Collins, CO, July.
- 1997 Brower, T., "Titan IV-B Flight Data Comparison of SRMU Pressures," TM-97-32620-002, Colorado State University Technical Report, Fort Collins, CO, June.
- 1997 Brower, T., "Droplet Flow in Reduced Gravity," Ph.D. Dissertation, Colorado State University, Fort Collins, CO, May.
- 1997 Brower, T., "Titan IV SRM/SRMU Stage O/I Core Angle of Side-Slip Limits for Aerodynamic Staging Coefficients," TM-97-32620-001, Colorado State University Technical Report, Fort Collins, CO, May.
- 1995 Brower, T., "Immiscible Fluid Separation in Low-Gravity Environments," Annual presentation for the NASA Graduate Student Researchers Program, Washington D.C., 1993, 1994 and 1995.
- 1993 Brower, T. and Sadeh, W., "Bond Number in Low-Gravity Environments," ASME Paper AMD-174/FED-Vol. 175, Fluid Mechanics Phenomena in Microgravity, Winter Annual Meeting, New Orleans, LA.
- 1990 Brower, T. and Demetriades, A., "Experiments on the Free Shear Layer Between Two Supersonic Streams," AIAA Paper No. 90-0710, 28th Aerospace Sciences Meeting, Reno, NV.

Industrial Publications

Dr. Brower authored more than 300 technical reports while tenured at the Lockheed Martin Corporation. These reports cover a broad cross-section of subjects including wind tunnel tests, data analysis, theoretical development of new analysis methodologies and computational fluid dynamic studies. Titles of these reports are available upon request.

Recent Grants

Principal Investigator -

"Research Experiences for Undergraduates" NSF program announcement 07-569 (\$12,800 for 1-year)

Oregon Department of Education Mathematics & Science Partnership (\$935K over 3-years)

Engineering & Technology Industry Council (\$373K over 2-years)

Intel (\$30K)

Professional Affiliations

American Institute of Aeronautics and Astronautics (AIAA), senior member
 American Society of Engineering Educators (ASEE), member

Program Chair, 2006 Conference for Industry and Education
Collaboration, San Antonio, Texas.

Assistant Vice Chair for Programs for the 2007 ASEE Annual Conference
in Honolulu, Hawaii.

Program Chair, 2008 ASEE Annual Conference in Pittsburg, PA.

American Society of Mechanical Engineers (ASME), member

ASME ABET Program Evaluator, 2004 - present.

Mechanical Engineering Technology Department Heads Committee,
Secretary (05-06), Vice Chair (06-07), Chair (07-08).

Honors and Awards

ASEE Recognition of Service as Program Chair, 2008 Annual Conference,
Engineering Technology Division.

ASEE Recognition of Service as Program Chair, 2006 CIEC.

ASME International, Student Section Advisor Award (1999).

OIT Outstanding Club Advisor Award (1999/2000).

OIT Faculty Achievement Award (**teacher of the year**), (2000).

OIT Certificate of Recognition for summer activities (2000/01).

OIT Student Affairs Most Valuable Partner Award (2001).

ASEE Engineering Technology Division Best Presenter Award for CIEC
Conference (2001).

Summer Assignments

Reduced Gravity Student Flight Opportunities Program, Houston, Texas (2000,
2001, 2002, 2005), Technology Space Camp Coordinator (2001, 2002), PLTW
Director, Affiliate PLTW Professor for POE and EDD (2006, 2007, 2008), 2006
Chautauqua Short Course "Atmospheric Science Utilizing High-Altitude Balloon
Experiments."