

## Curriculum Vitae

### **Jean R. Hertzberg**

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January 2010

### **Education**

Ph. D., Mechanical Engineering, University of California, Berkeley, December 1986.

M. S., Mechanical Engineering, University of California, Berkeley, June 1983.

B. S. E., Mechanical Engineering, University of Michigan, Ann Arbor, Magna Cum Laude May 1981.

### **Professional Experience**

Associate Professor May 1997 - present	Department of Mechanical Engineering University of Colorado, Boulder
Assistant Professor Jan. 1991 - May 1997	Department of Mechanical Engineering University of Colorado, Boulder
Research Associate Jan. 1987- Dec. 1990	Aerospace Engineering Department University of Southern California
Research Assistant Oct. 1981- Dec. 1986	Turbulent Combustion Group Lawrence Berkeley Laboratory
Research Assistant May 1981- Oct. 1981	Wood Combustion Studies University of Washington, Seattle
Research Assistant May 1980- Aug. 1980	Heat Transfer Laboratory University of Michigan, Ann Arbor
Junior Engineer May 1979- Aug. 1979	Assembly Engineering Dept. Metal Stamping Division Ford Motor Company, Dearborn, MI

## Professional Activities and Service

Associate Editor, eFluids.com, 2007-.

Portfolio Managing Editor, Journal of Visualization, 2006-2009.

Organizer and CoChair, Second Workshop on Fluids Education, American Physical Society, Division of Fluid Dynamics, 62nd Annual Meeting, Minneapolis, MN. Nov 23 2009.

Organizer and CoChair, First Workshop on Fluids Education, American Physical Society, Division of Fluid Dynamics, 61st Annual Meeting, San Antonio Texas. Nov 22 2008.

Minisymposium Organizer and Chair: “Fluids Education”, American Physical Society , Division of Fluid Dynamics, 59<sup>th</sup> Annual Meeting, Tampa FL, 2006; “Fluids Demonstrations and Instructional Laboratories”, American Physical Society , Division of Fluid Dynamics, 60th Annual Meeting, Salt Lake City, UT. Nov 18-20 2007; “Videos and Multimedia for Fluids Instruction”, American Physical Society , Division of Fluid Dynamics, 61th Annual Meeting, San Antonio Texas. Nov 23-25, 2008

Executive Committee Member-at-Large, American Physical Society , Division of Fluid Dynamics. Elected to 3 year term, 2007 – 2010.

Chair, Publications and Media Committee, American Physical Society , Division of Fluid Dynamics. 2008.

Founded the Fluids Education Google group, made up of 180 international engineering academics, 12/2006.

Founding Member, Colorado Alliance for Bioengineering (CAB), 1998-2001.

Organizer, Colorado State Fair Exhibit on Bioengineering, 2001.

Chair, CAB Day at Fitz. Organized Colorado Alliance for Bioengineering Day at Fitzsimons, a poster session that brought together over 150 members of the local bioengineering community, including faculty, staff and students from CU Boulder, Colorado State U., Colorado School of Mines and UCHSC, as well as members of the Colorado Biotechnology Association and the Colorado Biomedical Device Association. Described in the Denver Post 12/6/2000 Business section.

Co-Chair, Fluids: Experimental Techniques Session, 11<sup>th</sup> International Conference on Mechanics in Medicine and Biology, Maui, HI, April 2-5, 2000.

Participated in the Third Annual Women in Engineering Roundtable, sponsored by Graduating Engineer and Computer Careers Magazine. Described in the Feb. 2000 issue, pp 18 - 23.

Co-Chair, Work-In-Progress Poster Session, 27th Symposium (International) on Combustion, Boulder, CO 1998.

Member, Organizing Committee, 27th Symposium (International) on Combustion, Boulder, CO 1998.

Member, Organizing Committee, 15th International Colloquium on the Dynamics of Explosions and Reactive Systems, Boulder, CO, 1995.

Consultant, Science Review Panel, Microgravity Combustion Program, NASA Lewis, 1993.

Chair, Organizing Committee, Sixth Office of Naval Research Propulsion Meeting, Boulder, CO, 1993.

Member, Program Review Subcommittee, Combustion Institute, International Combustion Symposium, 1992, 1994, 1996, 1998, 2000.

Reviewer of papers, proposals and programs for:

*Journal of Fluid Mechanics*

*Physics of Fluids*

*Experiments in Fluids*

*Journal of Visualization*

*International Journal of Heat and Fluid Flow*

*Combustion and Flame*

*Combustion Science and Technology*

*International Symposium on Combustion*

*AIAA Journal*

*Journal of Heat and Fluid Flow*

*Journal of Propulsion and Power*

*Journal of Fluids Engineering*

*ASME Journal of Energy Resources Technology*

Office of Naval Research

Army Research Office

National Science Foundation

National Aeronautics and Space Administration

Membership:

Joint Center for Combustion and Environmental Research

American Institute of Aeronautics and Astronautics

Combustion Institute

American Physical Society

American Society for Engineering Education

American Association of University Women

American Association of University Professors

Tau Beta Pi

Pi Tau Sigma

### **Honors and Awards**

2010 Marinus Smith “Making a Difference” Teaching Excellence Award from the CU Boulder Parents Association.

2008 Best Poster in Flow and Motion category, International Society for Magnetic Resonance in Medicine 2008 meeting.

2006, 2003 Winner, Gallery of Fluid Motion, American Physical Society Division of Fluid Dynamics Annual Meeting

2006 2<sup>nd</sup> place Combustion Art competition, Central States Section, Combustion Institute.

2006 Seven Flow Visualization course images accepted into the juried CU Art/Science exhibit

2004-2005 Mechanical Engineering Outstanding Service Award, CU Boulder

2004 New Inventor of the Year Award, CU Boulder

2004 Best Paper PIC III, ASEE Annual Meeting

1997 Honorary Member, Pi Tau Sigma, Mechanical Engineering Honor Society

1996 Associate Fellow, American Institute of Aeronautics and Astronautics

1991 National Science Foundation Research Initiation Award

1985 IBM Fellowship

1981,1982 Graduate Opportunity Fellowship, U.C. Berkeley

1979 Member of Tau Beta Pi, the National Engineering Honor Society

1976-1980 Dean's Honor List, University of Michigan

1979 Ford Fellowship

1976 Ford Freshman Scholarship

1976 Society of Women Engineers Award

### **Research Grants**

A MEMS Pulsed Injection Electrostatic Atomizer for Small Engines. Subcontract to CU Boulder on US Army Small Business Technology Transfer (STTR)Phase II contract with TDA Inc, Proposal A2-3696. Principal Investigator: John W. Daily Duration: 09/01/09 - 08/31/11 Co-PI: Jean Hertzberg 25% time, 3 months Summer.

Experimental Investigation of Hospital Operating Room (OR) Air Distribution. Zhai PI, Hertzberg Co-PI, ASHRAE, 1.0 month summer, \$140,685. 09/1/08 – 8/31/10.

Development of a micro- and macro- particle image velocimetry system for opaque flows. Shandas PI, Hertzberg CoPI. NSF. \$526,268. 08/01/04 - 07/31/07. 10% AY, 0.5 month summer.

Real time ultrasound blood flow velocimetry. Shandas PI, Hertzberg Collaborator, NIH, 1.0 month AY. Total amount: \$300,000 6/1/04 - 5/31/06.

Principal Investigator, “Acquisition of a Particle Image Velocimetry System,” National Science Foundation, CTS 0114109, 11/1/2001-10/31/2003, \$82,000.

Principal Investigator, “Modeling of Mitral Flow Data,” Council on Research and Creative Work, CU Boulder, 2001, \$4,800.

Collaborator, “Mechanics of pulmonary hypertension”, 6/01 – 5/05, National Institutes of Health \$175,000.

Co-Investigator, “REU Supplement for ITR: An Interactive Experimental/Numerical Simulation System with Applications in MEMS Design” National Science Foundation, ACI-0083004, \$30,000, 9/1/2001- 8/31/03.

Senior Researcher, “ITR/ACS: An Interactive Experimental/Numerical Simulation System with Applications in MEMS Design,” National Science Foundation, 2000-2003, \$499,999.

Co-Investigator, “Fluid Mechanics of Ventricular Filling,” Whitaker Foundation, 1998-2001, \$205,587

Principal Investigator, NASA-NAG3-1616, “Three-Dimensional Flow in a Microgravity Diffusion Flame,” 1994-1998, \$400,000.

Co-Investigator, “Imaging System for Propulsion Phenomena” Office of Naval Research, 1997-1998, \$160,924

Principal Investigator, ONR-N000149311305, “Combustion Control in Compact Waste Incinerators,” 1993-1996, \$450,000.

Principal Investigator, ONR-N000149310118, “Combustion of High Energy Fuels,” 1992-1995, \$404,432.

Principal Investigator, ONR-N000149311184, “AASERT Supplement: Optical Soot Diagnostics for High Energy Fuel Combustion,” 1993-1996, \$123,787.

Principal Investigator, NSF-CTS-9109778, “Research Initiation Award: Combustion in an Asymmetric Configuration,” 1991-1993, \$70,000.

Principal Investigator, NSF-CTS-9109778-01, “Research Experience for Undergraduates Supplement: Combustion in an Asymmetric Configuration,” 1991-1993, \$10,000.

Co-Investigator, NSF-CTS-9111746, “Engineering Research Equipment: Laser Doppler Velocimetry System for Combustion Research,” 1991-1992, \$34,192.

## **Student Supervision**

### **PhD**

James McNeill (co-advised) “Operating Room Air Flows” began Fall 2008.

Natalie Ross (co-advised), “Point-Vortex Modeling of a Forced Planar Jet,” PhD May 2008.

Rui Wang, (co-advised) “Right Ventricular Assist Device for Fontan Patients: Pump Design, Fabrication and Assessment,” December 2007.

Lingli Liu (co-advised), “Fabrication of Capacitive Micromachined Ultrasonic Transducers,” December 2007.

Hairong Zheng (co-advised), “Effect of Ultrasonic Waveform on Nonlinear Microbubble Response”, May 2006.

Rick Luebs, “Cardiovascular Imaging,” PhD project Jan-Oct 2005.

John Carlton, "Three-Dimensional Flow in a Microgravity Diffusion Flame," Ph.D. August 2004.

Craig Weinberg (co-advised), "Noninvasive Measurement of Pulmonary Vascular Resistance in Pediatric Pulmonary Hypertension," Ph.D. student, co-advised by Robin Shandas, May 2003

Kevin Anderson (co-advised), "Simulation of Non-Premixed Actively Forced Reacting Vortical Structures Within a Confined Domain" Ph.D. student, co-advised by Shankar Mahalingam, May 1998.

Rom McGuffin (co-advised), "Combustion Instability in a Ramjet," Ph.D. student, co-advised by John Daily, December 1996.

Tae Chang, "Interaction between an Asymmetric Vortex Ring and a Wall," Ph.D. December 1994.

### **Masters**

Luis Loma "Flow in a Compliant Model Aorta," M.S. thesis May 2010.

Logan Williams, (co-advised) "Micro Echo PIV," M.S. thesis December 2008.

Paul Miller, "Flow in a Model Aorta," M.S. thesis May 2007.

Meg Van Sciver, "Flow Field Measurements of Human Generated Infectious Aerosols," M.S. Thesis, May 2005.

Andrew Shugard, "Emissions Measurement in a Split Diffusion Flame," M.S. project 2004.

Heather Chluda, "Vorticity Analysis of Left Ventricular MRI Data", Sept 2003- May 2004. MS project.

John Giardino, "Stereomicroscopic Particle Image velocimetry" MS Thesis, co-advised with E. Bradley. Completed May 2004.

Josh Madsen, "Emissions Measurement in a Split Diffusion Flame," M.S. project 2003.

Aravind Pittyvasanthakar, "Streamwise Vorticity Measurements in a Jet," M.S. project May 2004.

Bethany Rotherham, "Testing of Fin Designs for Air Cooled Condensers," M.S. project Fall 2002.

Evan Collier, "Modeling of Mitral Flow Data," MS Thesis, May 2001-May 2002.

Jason Cooke, "Fluid Dynamics of Ventricular Filling," MS Thesis, May 2001.

Eric Marquardt, "Compact Heat Exchanger Design," M.S. thesis, May 2002.

Edward Poulin, "Design of the Model Ramjet Automatic Control System," M.S. 1995

Devireddy Ramachandra, "Numerical Simulation of Vortex/Wall Interactions," M.S. thesis May 1995.

Margaret Thames, "Seeding of Low Velocity Flows," M.S. thesis 1995.

Brian Heiler, "High Energy Fuel Combustion," M.S. May 1994.

Matt Cuddy, "Forced Laminar Diffusion Flame," M.S. May 1994.

Patrick Zmarzly, "Velocity Measurements in an Electric Field Enhanced Outside Vapor Deposition Flame," M.S. December 1993.

Suzy Till, National Science Foundation GK-12 Fellow, 1999-2000.

Frank Friedl, National Science Foundation GK-12 Fellow, 2000-2001

Service on MS and PhD thesis committees for an additional 50 students.

Supervised undergraduate involvement in research via independent study and

UROP/URAP for 135 students.

### Summary of Courses Taught

Course	Semester	Enrollment
MCEN 1020/GEEN 1300 Computational and Analytic Tools: Lecture and laboratory	F 91	97
	F 92	88
	F 93	98
	F 94	94
GEEN 1400 First Year Projects: Lecture and laboratory	F97	30
	F98	29
	F99	23
	F01	28
	S04	30
	S08	30
MCEN 3012 Thermodynamics I: Lecture	F01	102
	F02	98
	F03	160
	F05	130
MCEN 3021 Fluid Mechanics: Lecture	F 95	82
	F 96	70
	F 07	175
	F 08	145
	F 09	128
MCEN 3022 Heat Transfer	S99	84
MCEN 3027 Measurements Laboratory: Lecture and laboratory	S 92	41
	S 93	54
	S 94	48
	S 95	46
	S 96	38
	F 97	10
	F 98	24
	F 99	37
	S 01	47
MCEN 3030 Numerical Methods: Lecture	S 93	83
	S 94	94

	S 97	54
	S 98	53
MCEN 4027 Senior Laboratory: Lecture and laboratory	S 91	23
MCEN 4151/5151 Flow Visualization: The Physics and Art of Fluid Flow. Co-taught as FINE 4097/5097, now crosslisted as FILM 4200/5200. New course development.	S03	42
	F04	25
	S06	25
	F07	35
	S 09	33
	S 10	30
MCEN 4228 Undergraduate Research Seminar in Combustion. New course development	S 95	9
MCEN 4228/5248 Special Topic: Digital Data Acquisition. New course development	S99	14
MCEN 4228/5228 Special Topic: Perception of Design New course development	F 09	30
MCEN 5021 Fluid Mechanics: Lecture	F 96	12
MCEN 5022 Thermodynamics: Lecture	S02	16
MCEN 5228 (Team taught) Special Topics in Combustion Theory	F 93	5
MCEN 5258 (Team taught) Special Topics in Combustion Science and Applications	F 92	11
MCEN 6278 Fluid Mechanics Measurements. New course development.	S 98	5

### University Service

Faculty Teaching Excellence Program as Faculty Associate 2008-  
Campus representative to, and founding member of the Colorado Alliance on  
Bioengineering, 1998-2002  
Co-Organizer for the First and Second CEAS Education Retreats. Duties included setting  
agenda, publicity, selecting venue, food and staffing.  
College Undergraduate Education Council, 2002-2006, 2008-  
College Humanities and Social Science Committee, 2005-2006  
College Committee on Bioengineering, Chair, 1998-2002  
College Computer Resources Committee, 1994-1995.  
College Freshman Computer Course Committee, 1993-1994.  
College Diversity Retreat participant, 1994.  
College Special Opportunity Search Committee, 1992.  
ITLL Faculty Advisory Council 2006  
ITLL Thermodynamics and Heat Transfer Focus Group 1997-2000  
ITLL Measurements Focus Group, 1995.  
ITLL High Performance Computing Focus Group, 1994.  
Mechanical Engineering Assessment and Curriculum Subcommittee Chair 2009-  
Mechanical Engineering ABET Committee Chair, 2004-2005.  
Mechanical Engineering Undergraduate Committee Chair, 2002-2006, 2008-2009

Mechanical Engineering Executive Committee 2002-2006, 2007-  
Mechanical Engineering Undergraduate Committee, 1994-1996, 2001-2002.  
Mechanical Engineering Industrial Relations Committee, 1996-1998,2001.  
Mechanical Engineering Ad Hoc Space Committee, 1997-1998.  
Mechanical Engineering Ad Hoc Laboratory Committee, 1991-1996.  
Mechanical Engineering Graduate Committee, 1991-1992.  
Mechanical Engineering Facilities Committee, 1992-1994.  
Undergraduate Initiative Fund Department Administrator, 1994-present.  
ME Department Computer Network Administrator, 1993-1998.  
ME Women's Network Facilitator, 1993-2002.  
Implemented the "Teamwork and Leadership Program" for M.E. freshmen, 1992-1994.  
Faculty Advisor for Pi Tau Sigma (Mechanical Engineering Honor Society), 1994-present.  
Panelist for the Faculty Teaching Excellence Program, 1993.  
Colorado Space Grant Consortium Reviewer, 1994.

### **Engineering Outreach Programs**

Expanding Your Horizons, 1992, 1994, 1995-1999, 2003-2006, 2008, 2009.  
"Forces In Fluids" Author and presenter, 2 day K4-12 school teachers workshop, in conjunction with the ITLL and TeachEngineering.com workshop series, July 12-13, 2007.  
"Forces In Fluids" Author and presenter, 3 hour high school teachers workshop, in conjunction with the APS Division of Fluid Dynamics annual meeting, 2006.  
"Floating and Falling Flows" NSDL TeachEngineering.com activity module, 2006.  
"Density Rainbow and the Great Viscosity Race" NSDL TeachEngineering.com activity module, 2006.  
CU Wizards Shows "Too Hot To Handle", 10/03, 9/05. "Go with the Flow" 9/04.  
"Shock Your Socks Off". K-12 Teacher Workshop 2002.  
"Kinetics For Kids". K-12 Physics Teacher Workshop, 1999, 2001.  
Women in Engineering Career Day, 1994,1996-1998, 2003, 2005.  
WIEP Energy Education Workshop 1999.  
Engineering Open House, 1991, 1992, 1994.  
Engineering Orientation, 1993, 1998, 1999-2005.  
Engineering Career Day, 1993, 1994.  
High School Honors Institute, 1993, 2006.  
Judge, California State Science Fair, 1988.  
Judge, Boulder Valley Regional Science Fair, 2002.

### **Archival Publications**

J. Hertzberg, M. Namazian and L. Talbot, "A Laser Tomographic Study of the Interaction of a Flame and a Karman Vortex Street," *Combustion, Science and Technology*, **38**, pp.205-216,1984.

P. Cho, C.K. Law, J. Hertzberg and R. Cheng " Structure and Propagation of Turbulent Premixed Flames Stabilized in a Stagnation Flow," *Twenty First Symposium (International) on Combustion*, Combustion Institute, 1986.

I.G. Shepherd, J.R. Hertzberg, L. Talbot, "Flame Holding in Unconfined Turbulent Premixed Flames." Paper presented at ICASE Workshop on Supersonic Combustion, NASA Langley, VA, Oct. 1989. Later published in *Major Research Topics in Combustion*, M.Y. Hussaini, A. Kumar, R.G. Voight, Editors. Springer-Verlag, New York, 1992.

J. Hertzberg, I. Shepherd, L. Talbot, "Vortex Shedding Behind Rod Stabilized Flames," *Combustion and Flame*, **86**, pp. 1-11, 1990.

J. Hertzberg and C.M. Ho, "Time-Averaged Three-Dimensional Flow in a Rectangular Sudden Expansion," *AIAA Journal*, **30** (10), pp. 2420-2425, errata **30**(11), pp. 2803, 1992.

J. Hertzberg and C.M. Ho, "Vortex Dynamics in a Rectangular Sudden Expansion," *Journal of Fluid Mechanics*, **289**, pp. 1-27, 1995.

K. Anderson, J. Hertzberg and S. Mahalingam, "Classification of Absolute and Convective Instabilities in a Bluff Body Stabilized Flame," *Combustion Science and Technology* **116**, pp. 257-269, 1996.

T.Y. Chang, J. Hertzberg, R. Kerr, "Three-Dimensional Vortex Wall Interaction: Entrainment in Numerical Simulation and Experiment," *Physics of Fluids* **9** (1) pp. 57-66, January 1997.

J. Hertzberg, "Conditions for a Split Diffusion Flame," *Combustion and Flame*, Vol. 109, pp 314-322, 1997.

J. Hertzberg, J. Carlton, E. Davis, M. Linne, "Splitting of Forced Elliptic Jets and Flames," *Journal of Image Processing and Flow Visualization*, Vol. 5, pp.155-165, 1998.

J.D. Luff, A.M. Rompage, M.A. Linne and J.R. Hertzberg, "Experimental Uncertainties Associated with Post-Processing of Particle Image Velocimetry (PIV) Based Algorithms," *Experiments in Fluids*, **26**, pp. 36-54, 1999.

K. R. Anderson, S. Mahalingam and J. Hertzberg, "A Two-Dimensional Planar Computational Investigation of Flame Broadening in Confined Non-Premixed Jets," *Combustion and Flame*, **118**, pp. 233-247, 1999.

- C.G. DeGroff, S. Bhatikar, J. Hertzberg, R. Shandas, L. Valdes-Cruz, R. Mahajan. Use of artificial neural networks to discriminate between innocent and pathological murmurs. <http://circ.ahajournals.org/cgi/content/abstract/103/22/2711>. *Circulation*, **103**(22), pp. 2711, 2000.
- R. Shandas, C. Weinberg, E. Nicol, D.D. Ivy, C. DeGroff, J. Hertzberg, L.M. Valdes-Cruz. "Development Of A Non-Invasive Ultrasound Color M-Mode Means Of Estimating Pulmonary Vascular Resistance In Pediatric Pulmonary Hypertension: Numerical Analysis", *In vitro Validation and Preliminary Clinical Studies*, *Circulation*, **104**, pp. 908-913, 2001.
- C. Weinberg, J. R. Hertzberg, R. Shandas "Utility of Intravascular Ultrasound to Measure Local Compliance of the Pediatric Pulmonary Artery: In Vitro Studies" *Journal of the American Society of Echocardiography* **15** (12) pp. 1507-1514, 2002.
- J. Cooke, J.R. Hertzberg, M. Boardman, R. Shandas, "Characterizing Vortex Ring Behavior During Ventricular Filling with Doppler Echocardiography: An In Vitro Study" *Annals of Biomedical Engineering*. **32**(2), pp. 245-256, 2004.
- T. Peacock, E. Bradley, J. Hertzberg, Y.C. Lee, "Forcing a planar jet flow using MEMS," *Experiments in Fluids*, Vol. 37(1), pp. 22-28, 2004.
- Zichun Ma, Elizabeth Bradley, Thomas Peacock, Jean R Hertzberg, Yung-Cheng Lee, "Solder-Assembled Large MEMS Flaps for Fluid Mixing" *IEEE Transactions on Advanced Packaging*, Vol 26, no. 3, August 2003, pp 268-276.
- H.-B. Kim, J. R. Hertzberg and R. Shandas, "Development and Validation of Echo PIV", *Experiments in Fluids*, ISSN:0723-4864, DOI: 10.1007/s00348-003-0743-5. Issue: Online First, Nov. 2003. Hardcopy Vol. 36(3), pp. 455-462, 2004.
- Carlson, L.E , Reitsma, R.F., Brandemuehl, M.J., Hertzberg, J.R., Sullivan, J.F. and Gabbard, S.G., (2003), Exploiting an Engineering *Building* as a Unique Distance Learning Tool, *International Journal of Engineering Education*. Vol. 19(3), pp. 379-388.
- Hyoung-Bum Kim, Jean Hertzberg, Craig Lanning, Robin Shandas, "Non-invasive measurement of steady and pulsating velocity profiles and shear rates in arteries using echo PIV: In vitro validation studies," *Annals of Biomedical Engineering*, **32** (8): 1067-1076, August 2004.
- J.R. Hertzberg and A. Sweetman, "A Course in Flow Visualization: the Art and Physics of Fluid Flow," 2004 ASEE Annual Conference Proceedings (reviewed), pp. 2449-2459. Session # 2480. "Best Paper of PIC III" \$1000 award <http://www.colorado.edu/MCEN/flowvis/ASEEpaper.pdf>.
- Mukdadi, O.M.; Hyoung-Bum Kim; Hertzberg, J.; Shandas, R., "Numerical modeling of microbubble backscatter to optimize ultrasound particle image velocimetry imaging: initial studies," *Ultrasonics*, **42** (10), pp. 1111-21, 2004.

Weinberg, C.E., Hertzberg, J.R., Ivy, D., Kirby, K. S., Chan, K.C., Valdes-Cruz, L., Shandas, R., “Extraction of Pulmonary Vascular Compliance, Pulmonary Vascular Resistance, and Right Ventricular Work From Single-Pressure and Doppler Flow Measurements in Children With Pulmonary Hypertension: a New Method for Evaluating Reactivity In Vitro and Clinical Studies,” *Circulation*, **110**, pp. 2609-2617, 2004.

Poon, M., Todd, J., Neilson, R., Grace, D., Hertzberg, J., “Saffman-Taylor Instability in a Hele-Shaw Cell,” *Physics of Fluids*, **16**(9), pp. S9, 2004. Gallery of Fluid Motion image. [http://pof.aip.org/pof/gallery/pdf/2004/S9\\_1.pdf](http://pof.aip.org/pof/gallery/pdf/2004/S9_1.pdf)

Hertzberg, J. and Sweetman, A., “Images of Fluid Flow: Art and Physics by Students” *Journal of Visualization*, **8**(2), pp. 145-152, 2005.

DeGroff, C. Birnbaum, B.; Shandas, R.; Orlando, W.; Hertzberg, J. “Computational simulations of the total cavo-pulmonary connection: insights in optimizing numerical solutions” *Medical Engineering & Physics*, **27**(2), pp 135-46, 2005

Zheng, Hairong; Mukdadi, Osama; Kim, Hyoungbum; Hertzberg, Jean R.; Shandas, Robin “Advantages in using multifrequency excitation of contrast microbubbles for enhancing echo particle image velocimetry techniques: Initial numerical studies using rectangular and triangular waves” *Ultrasound in Medicine and Biology*, **31**(1), pp 99-108, 2005.

P. Miller, K. Danielson, G. Moody, A. Slifka, E. Drexler and J. Hertzberg “Matching index of refraction using a diethyl phthalate/ethanol solution for in vitro cardiovascular models. Experiments in Fluids, Online First edition, June 20, 2006, DOI: 10.1007/s00348-006-0146-5, <http://dx.doi.org/10.1007/s00348-006-0146-5>. Hardcopy: 41:375-381, 2006.

Zheng, Hairong; Liu, Lingli; Williams, L.; Hertzberg, J.R.; Lanning, C.; Shandas, R. “Real time multicomponent echo particle image velocimetry technique for opaque flow imaging” *Applied Physics Letters*, v 88, n 26, 26 June 2006, p 261915-1-3 [http://scitation.aip.org/journals/doc/APPLAB-ft/vol\\_88/iss\\_26/261915\\_1.html](http://scitation.aip.org/journals/doc/APPLAB-ft/vol_88/iss_26/261915_1.html)

R. Wang, K. Hunter, J. Hertzberg, F. Lacour-Gayet, R. Shandas. “A Novel Microaxial Venous Assist Device for Enhancing Pulmonary Flow and Reducing Venous Pressure within the Total Cavopulmonary Connection: Computational Fluid Dynamic Studies”. *Journal of the American College of Cardiology*, V4, pp.238 (2006)

N. Ross, E. Bradley, and J. Hertzberg, "Dynamics-Informed Data Assimilation in a Qualitative Fluids Model," 20th International Workshop on Qualitative Reasoning, 2006 <http://www.cs.dartmouth.edu/~qr06/papers/ross-bradley-hertzberg-qr06.pdf>. Note: this is a highly reviewed and competitive conference.

R. Wang, F. Lacour-Gayet, Craig J. Lanning, B.A. Rech, P.J. Kilfoil, J. Hertzberg, R. Shandas. “Initial Experience with the Development and Numerical and In Vitro Studies of A Novel Low-Pressure Artificial Right Ventricle for Pediatric Fontan Patients”. *ASAIO Journal*, v 52, n 6, November/December, 2006, p 682-692 DOI: 10.1097/01.mat.0000249038.69048.3c

Read, Timothy; Ladtkow, Tanner; Fabri, Andrea; Hertzberg, Jean “Beading Up”. *Physics of Fluids*, v 19, n 9, September, 2007, p 091105. DOI: 10.1063/1.2775407.

<http://link.aip.org/link/?PHFLE6/19/091105/1>

Fujisawa, N., Verhoeckx, M., Dabiri, D, Gharib, M. and Hertzberg, J. “Recent Progress in Flow Visualization Techniques Toward the Generation of Fluid Art,” *Journal of Visualization*, v 10, n2, p 163-170, 2007.

[http://www.jov.jp/pdf/Vol10\\_No2/Regular\\_paper/Fujisawa.pdf](http://www.jov.jp/pdf/Vol10_No2/Regular_paper/Fujisawa.pdf)

John Giardino, Jean Hertzberg, and Elizabeth Bradley, “A calibration procedure for millimeter-scale stereomicroscopic particle image velocimetry,” *Experiments in Fluids* 45 (2008): 1037-1045, doi:10.1007/s00348-008-0525-1.

L.L. Liu, O.M. Mukdadi, M.K. Tripp, C.F. Herrmann, J.R. Hertzberg, S.M. George, V.M. Bright, and R. Shandas, “Atomic layer deposition for fabricating capacitive micromachined ultrasonic transducers: initial characterization”, *Sensors and Materials*, 20, no. 1 (2008): 15-34.

L.L. Liu, H.R. Zheng, F. Zhang, L.D.A. Williams, J.R. Hertzberg and R. Shandas, "Development of a custom designed echo particle image velocimetry system for multi-component hemodynamics measurement: system characterization and initial experiments", *Physics in Medicine and Biology*, Volume: 53 Issue: 5 Pages: 1397-1412 (2008)

William Kerwin, David Owens, Jean Hertzberg, Robin Shandas, Edward Gill, “Vortex Ring Formation in Diastolic Dysfunction: Phase Contrast MRI of Left Ventricular Filling” Poster 1377, Best Poster in Flow and Motion category, Proceedings of the 16th Scientific Meeting of the International Society for Magnetic Resonance in Medicine, Toronto, Canada, 3-9 May 2008.

Natalie Ross, Jean Hertzberg, and Elizabeth Bradley, “Discretization of the vorticity field of a planar jet,” *Experiments in Fluids* (4, 2010),  
<http://www.springerlink.com/index/10.1007/s00348-010-0862-8>.

### **Written Conference Papers and Reports**

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Jean Hertzberg, John Giardino, Elizabeth Bradley. “A Stereo-Microscopic Particle Image Velocimetry System” Paper NC-001. American Physical Society 57th Annual Meeting of the Division of Fluid Dynamics November 21-23, 2004 Seattle, Washington. Abstract published in *Bulletin APS Vol 49* (9), pp 214, Nov. 2004

Andrew Shugard, Jean Hertzberg. “Carbon Monoxide Emissions from an Axially Forced Methane Jet Flame” Paper NK008 American Physical Society 57th Annual Meeting of the Division of Fluid Dynamics November 21-23, 2004 Seattle, Washington. Abstract published in *Bulletin APS, Vol 49* (9), pp 228-9, Nov. 2004.

J. Hertzberg and A. Sweetman, “Art and Physics: A Flow Visualization Course and Outreach Experience”. Invited paper, DH02, 2005 Winter Meeting of the American Association of Physics Teachers. Albuquerque, NM, January 8-12, 2005. Abstract published in *The Announcer*, Vol 34, pg 106.

Colleen Stroud, Jean Hertzberg, Melvyn Branch, "Flame Impinging on a Roller" Image and text submitted to the NSF/Science Visualization Challenge, 5/31/05.

Curated a show of Flow Visualization images at Core New Art Space, 6/1/05-6/18/05, Denver, CO as part of Art+Math=X International Conference .

Jean Hertzberg, Images presented at the Dance Finale of the Boulder Fringe Festival, Boulder, CO, Aug 27, 2005

Jean Hertzberg, Julie Meg VanSciver, Shelly Miller “Flowfield of a Human Cough” Paper HA00001, 58<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Nov 20-22 2005, Chicago, Il. Abstract published in *Bulletin APS, Vol 50*, no. 9, pg 181.

Paul Miller, Kurt Danielson, Galan Moody, Andy Slifka, Elizabeth Drexler, Jean Hertzberg “Refractive index matching using a diethyl phthalate/ ethanol solution”, Paper GH 00005, 58<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Nov 20-22 2005, Chicago, Il. Abstract published in *Bulletin APS, Vol Vol 50*, no. 9, pg 167.

Natalie Ross, Elizabeth Bradley, Jean Hertzberg “Data Assimilation for Improved Point-Vortex Models” Paper NG 00009, 58<sup>th</sup> Annual Meeting of the Division of Fluid

Dynamics, American Physical Society, Nov 20-22 2005, Chicago, IL. Abstract published in *Bulletin APS*, Vol 50, no. 9, pg 284.

Joshua Grages, Jean Hertzberg, “Turbulent spray combustion of Wd-40” Poster submitted to the Combustion Art Competition, Central States Section, Combustion Institute, Cleveland, May 21-23, 2006.

Colleen Stroud, Melvyn Branch, Jean Hertzberg, “Impinging Turbulent Flames” Poster submitted to the Combustion Art Competition, Central States Section, Combustion Institute, Cleveland, May 21-23, 2006. 2<sup>nd</sup> place winner, with \$200 prize.

Jean Hertzberg “Flow Visualization for K-12 Outreach” Paper FH 00001, 59<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Nov 19-21 2006, Tampa Bay, FL. Abstract published in *Bulletin APS*, Vol 51, no. 9, pg 117.

Chris Ostoich, Jean Hertzberg “Cream in Tea” Gallery of Fluid Motion Poster 56, 59<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Tampa Bay, FL Nov 19-21 2006.

Chris Bonilha, Jean Hertzberg “Smoke Plume” Gallery of Fluid Motion Poster 52, 59<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Tampa Bay, FL Nov 19-21 2006.

Geneva Wilkesanders, Jean Hertzberg “Flames From Below” Gallery of Fluid Motion Poster 55, 59<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Tampa Bay, FL Nov 19-21 2006.

Timothy Read, Tanner Ladtkow, Andrea Fabri, Jean Hertzberg “Beading Up” Gallery of Fluid Motion Poster 54, 59<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Tampa Bay, FL Nov 19-21 2006. Winning image.

Tanner Ladtkow, Geneva Wilkesanders, Tim Read, Andrea Fabri, Jean Hertzberg “Roll Up” Gallery of Fluid Motion Poster 54, 59<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Tampa Bay, FL Nov 19-21 2006.

Hertzberg, Jean. “From Art to Physics: A Course on Flow Visualization.” 60<sup>th</sup> Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Salt Lake City, UT, Nov 20-22, 2007. Abstract published in *Bulletin APS*, Vol 52, no. 17, pg 181.

Natalie Ross, Elizabeth Bradley, and Jean Hertzberg “Discretization of the Vorticity Field of a Planar Jet,” 61st Annual Meeting of the Division of Fluid Dynamics, San Antonio, Texas, 2008. Abstract published in *Bulletin of the American Physical Society*, vol. 53, 287-288, 2008.

Luis Loma, Paul Miller, and Jean Hertzberg, "Flow in an Aortic Coarctation," 62nd Annual Meeting of the Division of Fluid Dynamics, Minneapolis, MN, November 22-24, 2009. Abstract published in *Bulletin of the American Physical Society*, vol. 54, 187, 2009.

James McNeill, Jean Hertzberg, Zhi-Qiang Zhai "Flow Visualization of Sterile Air Flows in Surgical Environments," 62nd Annual Meeting of the Division of Fluid Dynamics, Minneapolis, MN, November 22-24, 2009. Abstract published in *Bulletin of the American Physical Society*, vol. 54, 308, 2009.

### **Invited Seminars and Papers**

"Fluid Mechanics of Flame Stabilization," Brown University, Providence R.I., October 1986.

"Flame Anchoring in Premixed Flames" University of Washington, Seattle, WA, October 1986.

"Vortex Shedding in Rod Stabilized Flames" University of Southern California, L.A. CA, October 1986.

"Vortex Shedding in Rod Stabilized Flames" California Institute of Technology, Pasadena, CA, January 1987.

"Vortex Dynamics in an Asymmetric Sudden Expansion" California Polytechnic State University, San Luis Obispo, CA, May 1990.

"Vortex Dynamics in an Asymmetric Sudden Expansion" University of Colorado, Boulder, CO, May 1990.

"Behavior of Confined Shear Layers in a Rectangular Sudden Expansion" Cornell University, Ithaca, NY, August 1990.

"Behavior of Confined Shear Layers in a Rectangular Sudden Expansion" Arizona State University, Tempe, AZ, September 1990.

"Phase-Locked Three-Dimensional Flow in a Rectangular Sudden Expansion," Colorado School of Mines, Golden, CO, April 1993.

"Combustion Fluid Mechanics" Talk for ASME CU Boulder student chapter. February 1997.

"Split Jets and Flames in Microgravity," NASA Lewis, Cleveland OH, October 1997.

"Cardiac Fluid Dynamics," CU Boulder student chapter of the Biomedical Engineering Society, April 2001.

"Modeling Mitral Flow Data," Applied Mathematics Colloquium, Tuesday February 4, 2003, CU Boulder.

"Flow Visualization" with Alex Sweetman. Gallery talk on Flow Visualization course, at the Boulder Museum of Contemporary Art, 4/27/04. Accompanied full exhibit of images from the course, from 3/12/2004 to 5/2/2004

J. Hertzberg and A. Sweetman, "Art and Physics: A Flow Visualization Course and Outreach Experience". Invited paper, DH02, 2005 Winter Meeting of the American Association of Physics Teachers. Albuquerque, NM, January 8-12, 2005. Abstract published in *The Announcer*, Vol 34, pg 106.

"Teaching Flow Visualization: the Art and Physics of Fluid Flow" with Alex Sweetman. Invited talk, part of the CU Special Year in Art and Math. NCAR Mesa Laboratory, Feb 10, 2005

"A Course in Flow Visualization: the Art and Physics of Fluid Flow" Physics Education Research group meeting, Oct. 2005.

"Beautiful Physics From Ordinary Fluids" Guest lecture in MCEN 3021, 9/28/2006.

"Beautiful Physics From Ordinary Fluids" Sigma Xi invited talk, 11/6/2006.

"Beautiful Physics From Ordinary Fluids" TERC invited talk, 1/17/2007.

"Beautiful Physics From Ordinary Fluids" Applied Math Dept Seminar, CU Boulder, 2/16/2007.

"Beautiful Physics From Ordinary Fluids" Aerospace Engineering Dept Seminar, University of Washington, 3/5/2007.

"Beautiful Physics From Ordinary Fluids" Invited Seminar at University of Wyoming, Laramie, 3/6/2008.

"Introduction to Flow Visualization" Building Systems Seminar, CU Boulder 10/9/2008.