

C. RANDALL TRUMAN

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EDUCATION

1983 Ph.D., Arizona State University, Department of Mechanical and Aerospace Engineering
1976 M.S.E., Arizona State University, Department of Mechanical Engineering
1973 B.S.E., Northern Arizona University, College of Engineering

ACADEMIC EXPERIENCE

1997- University of New Mexico, Professor
1988-97 University of New Mexico, Associate Professor
1981-88 University of New Mexico, Assistant Professor

PROFESSIONAL EXPERIENCE

2006-09 Consultant, Applied Research Associates, Southwest Division, Albuquerque
2002-05 Fluid Mechanics Engineer (IPA) Air Force Research Laboratory (Phillips
Research Site), Chemical Laser Facility
1990-96 Consultant, Ecodynamics Research Associates, Albuquerque
1995-96 AFOSR University Resident Researcher, Air Force Phillips Laboratory,
Albuquerque
1990-94 Consultant, Thermal and Fluid Engineering Division, Sandia National
Laboratories, Albuquerque
Sum1991 Summer Faculty Researcher, Thermal and Fluid Engineering Division, Sandia
National Laboratories, Albuquerque
Sum1990 Summer Faculty Researcher, Advanced System Development Department, Sandia
National Laboratories, Albuquerque
1989-90 Consultant, TPL, Inc., Albuquerque
1988-89 AFOSR University Resident Researcher, Air Force Weapons Laboratory,
Albuquerque.
Sum1988 Stanford/NASA-Ames Center for Turbulence Research Summer Workshop
1987 Consultant, R & D Associates/Logicon, Albuquerque
Sum1986 AFOSR Summer Faculty Fellow, Air Force Weapons Laboratory, Albuquerque
1980-81 Garrett Turbine Engine Company, Phoenix, Engineering Science Engineer,
Aerodynamics Research Group
1973-1979 Consultant: Texas Instruments (Dallas), AiResearch (Phoenix), Spectrolab (San
Jose), Dow Chemical (Freeport)

C. RANDALL TRUMAN

ADMINISTRATIVE ASSIGNMENTS

ME Associate Chair, Jan. 2001-June 2002 (resigned to begin 2002-03 sabbatical leave)
ME Director of Graduate Programs, May 2001-June 2002
ME Course Scheduling (including ITV), 1999-2000
Coordinating ME Graduate Awards & Fellowships, 1998-2001

HONORS AND AWARDS

ME Students' Outstanding Faculty Award, 2013
AIAA Special Service Citation, 2011 (for leadership of Honors & Awards Subcommittee)
AIAA Special Service Citation, April 2005 (for improving Scholarships & Awards)
AIAA Sustained Service Citation, 2003 (one of 20 national awards)
New Mexico AGEP Outstanding Mentor Award, September 2002
UNM PURSUE Outstanding Mentor Award, April 2001
AIAA National Faculty Advisor Award, 1999
AIAA Special Service Citation, May 1999 (for support of Region IV Student Conference)
Students' Faculty Recognition Award, UNM School of Engineering, 1998-99
AIAA Special Service Citation, March 1998 (for ABQ and UNM Student Branch)
NASA-Ames/Stanford Center for Turbulence Research, Summer Workshop Fellow, 1988
AIAA Region IV Faculty Advisor Award, 1984-85
Pi Tau Sigma
Tau Beta Pi
Phi Kappa Phi

PROFESSIONAL ACTIVITIES

Referee: Journal of Fluid Mechanics, Physics of Fluids, Experiments in Fluids, AIAA Journal, Shock Waves, ASME Journal of Fluids Engineering, Intl. Journal of Heat & Fluid Flow, Journal of Computational Physics
Reviewer, National Science Foundation, April 2010, February 2010, May 2008
Chair of Aero-Thermal Review Panel, Thirty Meter Telescope Observatory, Pasadena, 2009
American Physical Society Division of Fluid Dynamics, 1993 Annual Meeting, Albuquerque, co-chair of Organizing Committee (net \$30K to APS-DFD to endow award funds)
Co-chair and co-organizer, AFOSR Workshop on AeroOptics, Chicago, June 1992 (led to 3-year AFOSR funded initiative)
New Mexico Space Grant Consortium, representative from Mechanical Engineering Department to UNM Faculty Committee, 1991-1999
American Institute of Aeronautics and Astronautics, Associate Fellow
University of New Mexico Student Branch Faculty Advisor 1982-present
Albuquerque Section: RAC IV Representative 1989-90, Chair 1988-89, Vice Chair 1987-88, Education Chair 1986-87, 1995-1998, Membership Chair 1982-86
AIAA Student Activities Committee, 1991-present
Chair of Honors & Awards Subcommittee, 2001-2011 (oversaw selection of about 50 scholarship and award winners)

C. RANDALL TRUMAN

SERVICE

AIAA UNM Student Branch, Faculty Advisor, 1982-present

Pi Tau Sigma UNM Chapter, Faculty Advisor, 1998-2005

Tau Beta Pi UNM Chapter, ME Faculty Advisor, 1981-88

Fluid Mechanics PE Exam Review, 1992, 1999, 2003

Fluid Mechanics FE Exam Review, 2003, 2004

Thermodynamics FE Exam Review, 2011, 2012

Mechanical Engineering Department

Laboratory and Computer Committee, 2010-13

Promotion and Tenure Committee, 1989-92, 1993-94, 1998-2002 (chair 2000-02),
2003-2005, 2008-2009

Faculty Steering Committee, 2004

Department Chair Search Committee, 2003-04

Laboratory and Space Committee, 2003-04

Graduate Committee, 1984-87 (chair 1985-87), 1996-2002

Library Liaison, 1987-88, 1989-2002

Computer Use Committee, 1992-96

School of Engineering

Policy Committee, 2013-present

ad hoc Committee to write Faculty Assembly Bylaws, 2012-2013

Liaison to Diversity Engineering Program, 1994-2007

Sloan UNM Scholar Faculty Advisory Committee, 1998-2003

Recruiter at national and regional conferences and regional universities, 1998-2001

Graduate Committee, 2001-02

Space Task Force, 1993-95

Research Committee, 1986-88 (chair 1987-88)

Computer Use Committee, 1984-85

Faculty Improvement Committee, 1985-86 (non-tenured faculty representative)

Continuing Education Committee, 1982-84

UNM Academic Freedom & Tenure Committee, 2005-2008

UNM Faculty Senate Committees:

Faculty/Staff Benefits, 2008-present (sabbatical 2009-10)

Budget, 2001-2002, 2003-2004

Library, 1994-1995, 1996-2001

UNM Ad hoc committee to study Library Resources Research Infrastructure, 1997-99

Associated Faculty, Scientific and Engineering Computation Certificate Program, 1996-present
(Chair of Admissions Committee 1998-2001)

Advisory Committee for NSF-funded NM-AGEP (Advancement of Graduate Education and the
Professoriate), 2001-2005

C. RANDALL TRUMAN

SCIENTIFIC AND PROFESSIONAL SOCIETIES

American Association of University Professors
American Institute of Aeronautics and Astronautics, Associate Fellow
American Physical Society, Division of Fluid Dynamics, Member
American Society of Mechanical Engineers, Member
Sigma Xi, Member

PATENTS

H.D.C. Smyth and C.R. Truman, Dry Powder Inhaler with Aeroelastic Dispersion Mechanism.
US 8,127,763, March 6, 2012.

SPONSORED RESEARCH

- 1/10-12/13 Shock-Driven Multiphase Hydrodynamic Experiments for Hydrocode Validation, NNSA Office of Research, Development & Simulation's Stewardship Science Academic Alliance, \$540K (co-PI w/ P. Vorobieff).
- 4/10-9/12 Experimental and Numerical Studies of Respirable Particle Transport from Surfaces by Acoustic/Shock Waves, DTRA Chemical and Biological Technologies Directorate New Initiatives, \$450K (co-PI w/ P. Vorobieff and H.D.C. Smyth).
- 7/09-9/10 Innovative Thermal Management for Space Vehicles, AFOSR for AFRL Office of Responsive Space (task under AFOSR grant, Real-Time Reconfigurable Systems, C. Christodoulos, lead), \$34K.
- 10/09-7/10 Energetic Systems and Unique Phenomena, Defense Threat Reduction Agency (DTRA) (task under UNM grant, F. Gilfeather, lead), \$199K (co-PI w/ P. Vorobieff).

C. RANDALL TRUMAN**SPONSORED RESEARCH, cont.**

- 1/08-3/10 Novel Dry Powder Inhaler Investigations, Cerner Corporation, \$337K (co-PI w/ H.D.C. Smyth, UNM Pharmacy).
- 7/07-10/09 Analysis of PLIF Images in Iodine Injection Studies, CU Aerospace, Champaign, IL (subcontract to DOD Phase II SBIR Improved Iodine Injection, Mixing and Pressure Recovery), \$30K (co-PI w/ P. Vorobieff).
- 7/07-9/09 Studies of High-Speed Mixing Flows with Particulates, Defense Threat Reduction Agency (DTRA) (task under UNM grant, F. Gilfeather, lead), \$401K (co-PI w/ P. Vorobieff).
- 3/07-7/07 PLIF for Iodine Injection, CU Aerospace, Champaign, IL (subcontract to DOD Phase I SBIR Improved Iodine Injection, Mixing and Pressure Recovery), \$20K (co-PI w/ P. Vorobieff)
- 1/06-12/06 A Novel Biomedical Inhaler With Improved Efficiency, Flow Rate Independence, And Potential For Modulation For Individualized Patient Therapy, UNM Cross-Campus Collaboration in Life Sciences, \$24K (co-PI w/ Prof. Hugh Smyth of Pharmacy).
- 1/05-9/06 Technical Oversight for High Energy Laser Research, AFRL Chemical Lasers Division (DEL) through Boeing, \$134K.
- 10/04-9/05 IPA: Diagnostics for Chemical Lasers, Air Force Research Laboratory, Chemical Lasers Branch (DELC), \$47K.
- 4/04-5/04 Chemical Laboratory Support, AFRL through Boeing, \$12K.
- 11/03-10/05 Acquisition of a Computational Platform for Interdisciplinary Computational and Experimental Research), Army Research Office, DOD Instrumentation Program for Hispanic-Serving Institutions, \$600K (including \$200K UNM matching) (co-PI w/ K. Christensen and M. Ingber).
- 10/03-9/05 Predictions of HYSIM HF Laser Flow, Missile Defense Agency Pilot Program for Science and Technology Research at HBCU/Minority Institutions (1st year contract through AFRL via Boeing, 2nd year through AFOSR grant), \$231K (co-PI w/ P. Vorobieff).
- 10/03-9/04 IPA: Chemical Laser Mixing, Air Force Research Laboratory, Chemical Lasers Branch (DELC), \$17K.

C. RANDALL TRUMAN**SPONSORED RESEARCH, cont.**

- 10/02-9/03 IPA: Application of Laser Spectroscopy Diagnostics to Chemical Lasers, Air Force Research Laboratory, Chemical Lasers Branch (DELIC), \$70K.
- 2/02-9/02 Flow Diagnostic System Development, Boeing/AFRL, \$104K (co-PI w/ P. Vorobieff).
- 5/01-9/03 Experimental Flow Diagnostics and Numerical Predictions of Mixing in Chemical Lasers, DARPA (High Energy Laser JTO), \$300K (co-PI w/ P. Vorobieff).
- 5/01-5/02 Optical Diagnostics for Transition and Turbulent Flow Control, NASA, part of UNM Intelligent System Engineering Center (co-PI w/ P. Vorobieff).
- 3/98-3/01 Simulation of Flow Control using Deformable Surfaces, NASA-Langley, \$300K.
- 6/97-5/01 AASERT: Research Training in Optical Propagation through Turbulent Shear Flows, Air Force Office of Scientific Research, \$114K.
- 10/00-9/01 Support of AFRL/DELIC HF Laser Diagnostics Development Testbed, Air Force Research Laboratory (via Boeing Task Order Contract, J.M. McIver, PI), \$20K.
- 3/00-2/01 PIV Diagnostics for Flow Control Applications, Air Force Office of Scientific Research/DURIP, \$121K (co-PI w/ P. Vorobieff).
- 3/99-2/00 Flow Diagnostic Instrumentation for Turbulent Flow Studies, Air Force Office of Scientific Research/DURIP, \$60K.
- 9/98-9/02 Optical Measurements in Large Scale Buoyant Plumes & Fires, Sandia National Laboratories, \$137K.
- 6/95-6/96 University Resident Researcher, Air Force Phillips Laboratory, Air Force Office of Scientific Research, \$49K.
- 3/94-9/97 Dynamics of a Passive Scalar in a Turbulent Jet, Air Force Office of Scientific Research, \$270K (co-PI w/ R.I. Zadoks).
- 10/93 Equipment Grant: Workstation for Computational Mechanics, Air Force Office of Scientific Research, \$48K (co-PI w/ H.L. Schreyer).
- 1/92-12/92 Lubrication Problems in Float Polishing, subtask from K. Jungling, PI, UNM Center for High-Technology Materials, on Air Force grant, \$11K.

C. RANDALL TRUMAN**SPONSORED RESEARCH, cont.**

- 12/91-11/93 Wind Erosion in Semiarid Landscapes: Predictive Models and Remote Sensing Methods for the Influence of Vegetation, National Aeronautics and Space Administration Soil Processes Program, \$113K (co-PI w/ H.B. Musick-UNM Biology).
- 11/90-12/93 Nonlinear Dynamical System Approach to Prediction of Scalar Field in Turbulent Channel Flow, Air Force Office of Scientific Research, \$110K (co-PI w/ R.I. Zadoks).
- 3/90-9/90 Predictions of Hypersonic Flow using a PNS Code with a Wall-Layer Model, General Dynamics, Fort Worth, \$20K.
- 3/90-9/90 Data Reduction and Analysis of Laser Induced Fluorescence Measurements in a Hypersonic Free Jet, Air Force Weapons Laboratory, Albuquerque, \$7K.
- 8/89-5/90 Laser Doppler Velocimeter Measurements in a Three-Dimensional Flow, Lovelace Medical Foundation, Albuquerque, \$3K (estimated).
- 12/87-5/88 Prediction of Optical Phase Error Induced by a Turbulent Supersonic Mixing Layer, Air Force Weapons Laboratory, Albuquerque, \$8K.
- 11/87-12/89 Parabolized Navier-Stokes Predictions of Supersonic and Hypersonic Flow Using a Half-Equation Turbulence Model, Sandia National Laboratories, Albuquerque, \$40K.
- 3/87-8/89 Prediction of Optical Phase Degradation Due to a Turbulent Shear Layer, Air Force Office of Scientific Research, \$111K (includes University Resident Researcher at Air Force Weapons Laboratory for 1988-89 sabbatical).
- 7/86-11/87 Modification of Algebraic Turbulence Models for a Parabolized Navier-Stokes Code, Sandia National Laboratories, Albuquerque, \$40K.
- 5/85-6/86 Numerical Study of an Algebraic Turbulence Model for a Parabolized Navier-Stokes Code, Sandia National Laboratories, Albuquerque, \$40K.
- 2/85-4/85 Calibration of Low-Velocity Probes, Sandia National Laboratories, Albuquerque, \$3K.
- 10/83-9/84 Prediction and Measurement of a Complex Three-Dimensional Turbulent Flow, Sandia National Laboratories, Albuquerque, \$30K.
- 10/82-9/83 Numerical Solution of a Complex Three-Dimensional Flow, Sandia National Laboratories, Albuquerque, \$30K.

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PUBLICATIONS (student names in italics)

Corbin, C., Vorobieff, P., Wayne, P., Bernard, T., Truman, C.R., and Kumar, S., 2013, "Experimental Studies of Shock Interactions with a Multiphase Medium," Proceedings, 29th International Symposium on Shock Waves (ISSW), 14-19 July, Madison WI.

Vorobieff, P., Anderson, M., Conroy, J., Truman, C.R., and Kumar, S., 2013, "Morphology of Shock-accelerated Multiphase Flow: Experiment and Modeling," Proceedings, Multiphase Flow 2013, 7th Intl. Conf. on Computational and Experimental Methods in Multiphase and Complex Flow, 3-5 July, A Coruna, Spain, eds. P. Vorobieff & C.A. Brebbia.

Truman, C.R., Anderson, M., Vorobieff, P., Wayne, P., Corbin, C., Bernard, T., and Kuehner, G., 2013, "Spike and Vortex Formation in an Impulsively-accelerated Multiphase Medium, Multiphase Flow, Proceedings, Multiphase Flow 2013, 7th Intl. Conf. on Computational and Experimental Methods in Multiphase and Complex Flow, 3-5 July, A Coruna, Spain, eds. P. Vorobieff & C.A. Brebbia.

Wayne, P.J., Vorobieff, P., Smyth, H., Bernard, T., Corbin, C., Maloney, A., Conroy, J., White, R., Anderson, M., Kumar, S., Truman, C.R., and Srivastava, D., 2013, "Shock-Driven Particle Transport Off Smooth And Rough Surfaces," Journal of Fluids Engineering. Vol. 35, 061302.

Anderson, M., Vorobieff, P., Kumar, S., Conroy, J., White, R., Needham, C., and Truman, C.R., 2012, "Numerical Simulation of a Shock-Accelerated Multiphase Fluid Interface," 28th International Symposium on Shockwaves (ISSW), vol. 2, ed. K. Kontis, Springer, Berlin, pp. 923-929.

P. Vorobieff, Anderson, M., Conroy, J., White, R., Truman, C.R., and Kumar, S., 2012, "Vortex Deposition In Shock-Accelerated Gas With Particle/Droplet Seeding," AIP Conf. Proc. 1426, eds. Elert, M.L., et al., American Institute of Physics, Melville, NY, pp. 1651-1654 (from Shock Compression of Condensed Matter , July 2011).

Vorobieff, P., Anderson, M., Conroy, J., White, R., Truman, C.R., and Kumar, S., 2011, "Vortex Formation in Shock-accelerated Gas Induced by Particle Seeding," Physical Review Letters, Vol. 106, 184503.

Vorobieff, P., Truman, C.R., Ragheb, A.M., Elliott, G.S., Laystrom-Woodard, J.K., King, D.M., and Solomon, W.C., 2011, "Mixing Enhancement in a Multi-stream Injection Nozzle," Experiments in Fluids, Vol. 51, no. 3, pp. 711-72.

Vorobieff, P., Anderson, M., Conroy, J., White, R., Truman, C.R., and Kumar, S., 2011, "Analogues of Rayleigh-Taylor and Richtmyer-Meshkov Instabilities in Flows with Nonuniform Particle and Droplet Seeding," Computational Methods in Multiphase Flow VI, eds. A.A. Mammoli, C.A. Brebbia, WIT Press, Southampton, UK, pp. 17-28.

Selvam, P., Marek, S., Truman, C.R., McNair, D., and Smyth, H.D.C., 2011, "Micronized Drug Adhesion and Detachment from Surfaces: Effect of Loading Conditions," Aerosol Science and Technology, Vol. 45, pp. 81-87.

Noren, C., Vorobieff, P., Truman, C.R., and Madden, T.J., 2011, "Mixing in a Supersonic COIL Laser: Influence of Trip Jets," Experiments in Fluids, Vol. 50, pp. 443-455 (also AIAA Paper 2008-3881).

Selvam, P., McNair, D., Truman, C.R., and Smyth, H.D.C., 2010, "A Novel Dry Powder Inhaler: Effect of Device Design on Dispersion Performance," International Journal of Pharmaceutics, Vol. 401, pp. 1-6.

Chavez, M., Vorobieff, P., Truman, C.R., and Johnson, E., 2009, "Experimental Studies of Shock Wave Interaction with Droplets and Particulates," AIAA Paper 2009-4050.

Donovan, M., Selvam, P., Singh, S., McNair, D., Truman, C.R., and Smyth, H.D.C., 2009, "Tunable Dry Powder Inhalers: Future or Folly?" Invited Review, Respiratory Drug Delivery RDD Europe 2009, eds. Dalby, R.N., et al., Virginia Commonwealth Univ., Richmond, Vol. 2, pp. 429-432.

Smyth, H.D., Gallegos, M., and Truman, C.R., 2008, "A Novel Mechanism Of Dry Powder Inhaler Dispersion: Optimizing Flow Induced Flutter," Respiratory Drug Delivery 2008, eds. Dalby, R.N., et al., Virginia Commonwealth Univ., Richmond, Vol.3, pp.877-80.

Palekar, A., Vorobieff, P., and Truman, C.R., 2007, "Two-dimensional Simulation of a Shock-Accelerated Gas Cylinder," Progress in Computational Fluid Dynamics, Vol. 7, pp. 427-438.

Noren, C., Truman, C.R., Vorobieff, P., Madden, T.J., and Hager, G., 2006, "PLIF Visualization and Quantitative Mixing Measurements of a Supersonic Injection Nozzle," AIAA Paper 2006-2895, AIAA Plasmadynamics and Lasers Conference.

Palekar, A., Truman, C.R., and Vorobieff, P., 2005, "Prediction of Transverse Injection of a Sonic Jet in Supersonic Crossflow," AIAA Paper 2005-5366, AIAA Plasmadynamics & Lasers Conference.

Noren, C.A., Rothschof, G., Perschbacher, T., Madden, T.J., Hager, G.D., Truman, C.R., and Vorobieff, P.V., 2005, "PLIF Flow Visualization of a Supersonic Injection COIL Nozzle," AIAA Paper 2005-5388, AIAA Plasmadynamics & Lasers Conference.

Wisniewski, C.F., Hewett, K.B., Manke, G.C. II, Truman, C.R., and Hager, G.D., 2004, "Hydrogen fluoride overtone laser: 2D CFD modeling of the small signal gain," Proceedings of the SPIE - The International Society for Optical Engineering, High Power Laser Ablation Vol. 5448, no.1, p.1127-38.

Bogucki, D.J., Domaradzki, J.A., Ecke, R.E., and Truman, C.R., 2004, "Light Scattering on Oceanic Turbulence," Applied Optics, Vol. 43, pp. 5662-69.

Yazzie, R., Truman, C.R. and Salari, K., 2004, "Prediction of Oscillatory Flow Excitation at the Leading Edge of a Modified NACA 0015 Airfoil," AIAA Paper 2004-0749, AIAA Aerospace Sciences Meeting.

Wisniewski, C.F., Hewett, K.B., Manke, G.C., Truman, C.R., and Hager, G.D., 2003, "Spatially Resolved Sub-Doppler Overtone Gain Measurements on a Small-scale Supersonic HF Laser," in Recent Research Developments in Quantum Electronics, Vol. 3, pp. 41-83, ed. S.G. Pandalai, Transworld Research Network, Kerala, India.

Manke, G.C. II, Hewett, K.B., *Wisniewski, C.F.*, Truman, C.R., and Hager, G.D., 2003, "On the Presence of Rotational Nonequilibrium in a Supersonic HF Laser," IEEE Journal of Quantum Electronics, Vol. 39, pp. 1625-1634 (also AIAA Paper 2003-3753).

Wisniewski, C.F., Hewett, K.B., Manke, G.C., Crowell, P.G., Truman, C.R., and Hager, G.D., 2003, "Small Signal Gain Measurements in a Small Scale HF Overtone Laser," Applied Physics A, Vol. 77, pp. 337-342.

Wisniewski, C.F., Hewett, K.B., Manke, G.C. II, Truman, C.R., and Hager, G.D., 2003, "Non-Intrusive Mach Number Measurement in Supersonic Hydrogen Fluoride Laser," Chemical Physics Letters, Vol. 371, pp. 522-527.

Wisniewski, C.F., Hewett, K.B., Manke, G.C. II, Truman, C.R., and Hager, G.D., 2003, "Direct Measurements of Fluorine Atom Concentration, Gain Length and Small Signal Gain in an Hydrogen Fluorine Overtone Laser," Chemical Physics Letters, Vol. 370, pp. 591-596.

Chavez, P., Truman, C.R., Christensen, K.T., and Vorobieff, P., 2002, "Laser Wavefront Diagnostics of a Heated Mixing Layer," AIAA Paper 2002-2270, AIAA Plasmadynamics & Lasers Conference.

Wisniewski, C.F., Manke, G.C. II, Hager, G.D., Crowell, P.F. and Truman, C.R., 2002, "Tunable Diode Laser Gain Measurements of the HF(2-0) Overtone Transitions in a Small Scale HF Laser," SPIE Symposium on Electronic Imaging Science and Technology, San Jose, Proceedings SPIE, Vol. 4631, Gas and Chemical Lasers and Intense Beam Applications III, pp. 167-177 (also AIAA Paper 2002-2267).

McMackin, L., Hugo, R.J., Bishop, K.P., Chen, E.Y., Pierson, R.E. and Truman, C.R., 1999, "High speed optical tomography system for quantitative measurement and visualization of dynamic features in a round jet," Experiments in Fluids, Vol. 26, pp. 249-256.

Truman, C.R., McMackin, L., Pierson, R.E., Bishop, K.P. and Chen, E.Y., 1998, "Open-loop Control of Compensation for Optical Propagation Through a Turbulent Shear Flow," AIAA Paper 98-2832, AIAA Plasmadynamics & Lasers Conference.

Nelson, I.I. and Truman, C.R., 1998, "Identification of Large Scale Structures in a Turbulent Jet using Optical Techniques," AIAA Paper 98-3016, AIAA Fluid Dynamics Conference.

McMackin, L., Hugo, R.J., Pierson, R.E., and Truman, C.R., 1997, "High speed optical tomography system for imaging dynamic transparent media," Optics Express, Vol. 1, No. 11, [plus "cover" movie] (online electronic journal, <http://epubs.osa.org/opticsexpress/>).

Truman, C.R. and *Sapayo, J.*, 1997, "Compensation in Optical Propagation Through a Turbulent Shear Flow," AIAA Paper 97-1809, AIAA Fluid Dynamics Conference.

Luna, T.L., Truman, C.R., and Masson, B.S., 1997, "Linear Stochastic Estimation of Optical Beam Deflection Through a Heated Jet," AIAA Paper 97-0072, AIAA Aerospace Sciences Meeting.

Truman, C.R., *Luna, T.*, McMackin, L., Masson, B.S., Bishop, K.P., and Chen, E.Y., 1996, "Optical Tomographic Study of the Effect of Excitation of a Heated Round Jet," AIAA Paper 96-2323, AIAA Plasmadynamics & Lasers Conference.

Truman, C.R., Masson, B.S., and McMackin, L., 1996, "Measurement of Length Scales in a Turbulent Jet with an Optical Technique," in Experimental & Numerical Flow Visualization and Laser Anemometry, ASME Fluids Engineering Summer Meeting, Vol. 4, pp. 83-90 (conference proceedings).

Musick, H.B., *Trujillo, S.M.*, and Truman, C.R., 1996, "Wind-Tunnel Modeling of the Influence of Vegetation Structure on Saltation Threshold," Earth Surface Processes and Landforms, Vol. 21, pp. 589-605.

Truman, C.R., Barsun, H., Luna, T. and Zadoks, R.I., 1995, "Dynamics of a Passive Scalar in a Turbulent Jet," AIAA Paper 95-1981, AIAA Plasmadynamics & Lasers Conference.

Wisniewski, C., Scruggs, B., Masson, B., Kyrakis, D. and Truman, C.R., 1995, "Calibration of Constant-Current Anemometer Probes for Aircraft-Based Atmospheric Turbulence Measurements," AIAA Paper 95-1985, AIAA Plasmadynamics & Lasers Conference.

Truman, C.R., Barsun, H., Staveley, B., and Zadoks, R.I., 1994, "Prediction and Measurement of AeroOptic Effects Through the Dynamics of a Passive Scalar in Turbulent Shear Flow," AIAA Paper 94-2549 (invited), AIAA 18th Aerospace Ground Testing Conference.

Doerr, S., Wissler, J., McMackin, L., and Truman, C.R., 1993, "Aero-Optics Research at the Phillips Laboratory," in SPIE Conference Proceedings 2005, Technical Conference on Optical Diagnostics in Fluid and Thermal Flow, SPIE Paper 2005-14, pp. 129-138.

Larson, K.F., Truman, C.R., and Zadoks, R.I., 1993, "Turbulent Scalar Fluctuation Predictions from a Dynamical Model," AIAA Paper 93-3102, AIAA 24th Fluid Dynamics Conference.

Larson, K.F., Zadoks, R.I., and Truman, C.R., 1993, "Dynamical System Prediction of the Scalar Field in a Near-Wall Turbulent Flow," in Near-Wall Turbulent Flows, eds. R.M.C. So, C.G. Speziale & B.E. Launder, Elsevier Science Publ., Amsterdam, pp. 53-62.

Larson, K.F., Zadoks, R.I., and Truman, C.R., 1993, "Turbulent scalar fluctuation predictions from a dynamical model," AIAA Paper 93-3102, AIAA 24th Fluid Dynamics Conference.

Truman, C.R., Shirazi, S.A., and Blottner, F.G., 1993, "Noniterative Solution for Pressure in Parabolic Flows," ASME Journal of Fluids Engineering, Vol. 115, pp. 627-630. (extended version in Advances and Applications in Computational Fluid Dynamics, ASME FED-Vol. 66, 1988, pp. 121-127).

Truman, C.R., 1992, "The Influence of Turbulent Structure on Optical Phase Distortion Through Turbulent Shear Flow," AIAA Paper 92-2817, AIAA SDIO Technology Conference.

Woolhiser, C.C., Truman, C.R., Jumper, E.J., and Masson, B.S., 1992, "A Chlorine Utilization Study for Uniform-Droplet Singlet Delta Oxygen Generators," Journal of Thermophysics and Heat Transfer, Vol. 6, pp. 460-466.

Shirazi, S.A. and Truman, C.R., 1991, "Simple Turbulence Models for Supersonic Flows: Bodies at Incidence and Compression Corners," AIAA Journal, Vol. 29, pp. 1850-1859.

Truman, C.R. and Lee, M.J., 1990, "Effects of Organized Turbulence Structures on the Phase Distortion in a Coherent Optical Beam Propagating Through a Turbulent Shear Flow," Physics of Fluids A, Vol. 2, pp. 851-857.

Smith, R.R., Truman, C.R., and Masson, B.S., 1990, "Prediction of Optical Phase Degradation using a Turbulent Transport Equation for the Variance of Index-of-Refractive Fluctuations," AIAA Paper 90-0250, AIAA Aerospace Sciences Meeting.

Truman, C.R. and Lee, M.J., 1989, "Correlation of Optical Phase Distortion With Turbulent Structure in a Homogeneous Shear Flow," in Proceedings, Seventh Symposium on Turbulent Shear Flows, Stanford University, Paper 22-3.

Truman, C.R. and Wildin, M.W., 1989, "Finite Difference Model for Heat Transfer In a Stratified Thermal Storage Tank with Throughflow," in Numerical Heat Transfer with Personal Computers and Supercomputers, ASME HTD-Vol. 110, pp. 45-55.

Shirazi, S.A. and Truman, C.R., 1989, "Evaluation of Algebraic Turbulence Models for PNS Predictions of Supersonic Flow Past a Sphere-Cone," AIAA Journal, Vol. 27, pp. 560-568.

Truman, C.R. and Wildin, M.W., 1989, "Performance of Stratified Vertical Cylindrical Thermal Storage Tanks, Part I: Scale Model Tank," ASHRAE Transactions, Vol. 95, pt. 1, pp. 1086-1095 (also in Cool Storage Applications, ASHRAE Technical Data Bulletin, Vol. 5, No. 3, pp. 63-72).

Clark, T.T., Truman, C.R., and Masson, B.S., 1988, "Optical Propagation Through Computational Turbulence Using a Parabolized Helmholtz Equation," AIAA Paper 88-3663.

Baxter, M.R., Truman, C.R., and Masson, B.S., 1988, "Predicting the Optical Quality of Supersonic Shear Layers," AIAA Paper 88-2771, AIAA Plasmadynamics & Lasers Conference.

Schreiber, H., Truman, C.R., and Acebal, R., 1988, "A Direct Contact Condenser Model for High Energy Laser Exhaust Flows," AIAA Paper 88-2754, AIAA Plasmadynamics & Lasers Conference.

Shirazi, S.A. and Truman, C.R., 1988, "A Study of Algebraic and Half-Equation Turbulence Models for Hypersonic PNS Predictions," AIAA Paper 88-0222, AIAA Aerospace Sciences Meeting.

Shirazi, S.A. and Truman, C.R., 1988, "Prediction of Turbulent Source Flow Between Corotating Disks with an Anisotropic Two-Equation Turbulence Model," ASME Journal of Turbomachinery, Vol. 110, pp. 187-194.

Yoo, J., Wildin, M.W., and Truman, C.R., 1987, "Traveling Velocity of Thermally- Driven Two-Dimensional Gravity Currents," in Natural Circulation, ASME FED-Vol. 61, HTD-Vol. 92, pp. 319-324.

Yoo, J., Wildin, M.W., and Truman, C.R., 1986, "Initial Formation of a Thermocline in Stratified Thermal Storage Tanks," ASHRAE Transactions, vol. 92, pt. 2a, pp. 280-292.

Truman, C.R., *Roybal, L.G.*, and Wildin, M.W., 1985, "A Finite Difference Model for Stratified Chilled Water Thermal Storage Tanks," in Proceedings, ENERSTOCK 85, 3rd International Conference on Energy Storage for Building Heating and Cooling, Toronto, pp. 613-617.

Truman, C.R., Wildin, M.W., and *Yoo, J.*, 1985, "Scale Modeling of Stratified Water Thermal Storage Tanks," in Proceedings, International Symposium on Modeling Environmental Flows, Joint ASCE/ASME Mechanics Conference, pp. 93-102.

Wildin, M.W. and Truman, C.R., 1985, "A Summary of Experience with Stratified Chilled Water Tanks," ASHRAE Transactions, vol. 91, pp. 956-976. (Also in Thermal Storage, ASHRAE Technical Data Bulletin, 1985, pp. 104-123).

Truman, C.R. and Jankowski, D.F., 1985, "Prediction of Turbulent Source Flow Between Stationary and Rotating Discs," International Journal of Heat and Fluid Flow, vol. 6, pp. 69-78.

Florschuetz, L.W., Truman, C.R., and D.E. Metzger, 1981, "Streamwise Flow and Heat Transfer Distributions for Jet Array Impingement with Crossflow," ASME Journal of Heat Transfer, vol. 103, pp. 337-342.

Truman, C.R., Rice, W., and Jankowski, D.F., 1979, "Laminar Throughflow of a Fluid Containing Particles Between Corotating Disks," ASME Journal of Fluids Engineering, vol. 101, pp. 87-92.

Truman, C.R., Rice, W., and Jankowski, D.F., 1978, "Laminar Throughflow of Varying-Quality Steam Between Corotating Disks," ASME Journal of Fluids Engineering, vol. 100, pp. 194-200.

Rice, W., Jankowski, D.F., and Truman, C.R., 1976, "Bulk-Parameter Analysis for Two-Phase Throughflow Between Parallel Corotating Disks," in Proceedings, 1976 Heat Transfer and Fluid Mechanics Institute, University of California, Davis, pp. 77-91.

C. RANDALL TRUMAN

INVITED LECTURES

“Interdisciplinary Adventures in Fluid Mechanics and Aerodynamics”, Department of Mechanical Engineering, New Mexico State University, March 2005.

“Stochastic Estimation and Correction of Optical Deflection Produced by a Turbulent Jet,” Department of Aeronautics Seminar, Graduate Aeronautical Laboratories, California Institute of Technology (GALCIT), February 1997.

"Stochastic Estimation of Optical Propagation Through a Turbulent Jet," Aerospace Engineering Seminar, University of Southern California, October 1996.

"The Effects of Turbulent Structure Dynamics on Optical Propagation Through Shear Flows," AFOSR AeroOptic Workshop, Albuquerque, August 1993.

"Turbulence Structure Influence on Optical Phase Distortion," Turbulence Research: Joint AFOSR/ONR Grantee and Contractors' Meeting, Chicago, June 1992.

"Application of FIDAP to a Conjugate Heat Transfer Problem," Sandia National Laboratories, Albuquerque, November 1991.

"Correlation of Optical Phase Distortion with Turbulent Structure in a Homogeneous Shear Flow," Department of Aeronautics Seminar, Graduate Aeronautical Laboratories, California Institute of Technology (GALCIT), October 1989.

"Optical Propagation Through a Homogeneous Turbulent Shear Flow," Department of Mechanical & Aerospace Engineering Seminar, Arizona State University, September 1988.

"Comparison of Algebraic Turbulence Models for PNS Predictions of Supersonic Flow Past a Sphere-Cone," (with S.A. Shirazi), AFWAL Parabolized Navier-Stokes Code User's Meeting, Dayton, September 1986.

"Turbulence Modeling for Complex Three-Dimensional Turbulent Flows," Sandia National Laboratories, Albuquerque, October 1984.

C. RANDALL TRUMAN

TEACHING

ME 301 *Thermodynamics* is the required junior-level course taken by all ME students.

ME 317L *Fluid Mechanics* is the required junior-level course taken by all ME students. In addition to three lecture hours, a one-hour laboratory component was added in 2001. I established the laboratory component of the undergraduate course and continue to develop experiments for it.

ME 428/528 *Intermediate Fluid Mechanics* (Previously ME 430) is an undergraduate technical elective and introductory graduate course. The fundamental principles of fluid mechanics are reviewed and extended to advanced topics that arise in mechanical engineering practice. Laboratory experience will be provided through measurement technique demonstrations and one or two packaged experiments. Several short design projects are assigned, such as selecting components for a piping network, designing a turbomachine laboratory experiment, or carrying out a flow system design which utilizes lubrication theory, potential flow or boundary layer analyses.

ME 429/529 *Gas Dynamics* (formerly ME 532 and ME 461/561) is an undergraduate technical elective and introductory graduate course with undergraduate fluid mechanics and thermodynamics as its only prerequisites. Topics include one and two-dimensional compressible flow of ideal gases including shock waves, friction and heat transfer. The fundamental equations of compressible flow are discussed along with applications, including numerical and experimental methods. A shock-tube laboratory exercise has been added using our research facility.

ME 530 *Theoretical Fluid Mechanics* is the graduate-level fluids course that satisfies the ME graduate core requirement for thermal sciences. This is a rigorous introduction to fluid mechanics, with an emphasis on developing students' understanding of the basic equations for the various fluid/flow models from first principles.

ME 534 *Boundary Layers* The first half of ME 534 is standard viscous flow material, with the second half consisting of numerical methods, turbulence and transition modeling.

ME 634 *Turbulence and Turbulent Boundary Layers* is the most flexible of all the courses that I teach and has varied significantly each time I have taught it. While all variations included transition, Reynolds stress modeling, and experimental techniques, the rest of the class time is reflective of the interests of the students in the class and on my current research.

C. RANDALL TRUMAN

COURSES TAUGHT

Course	Level	Semester
ME 301 <i>Thermodynamics</i>	Undergraduate	Spring 2009, Fall 2008, Spring 2008, Spring 2007, Spring 2006, Spring 1995, Fall 1981
ME 306 <i>Dynamics</i>	Undergraduate	Fall 2010
ME 317 <i>Fluid Mechanics</i>	Undergraduate	Fall 2012, Spring 2012, Fall 2011, Spring 2011, Fall 2010, Spring 2009, Fall 2008, Fall 2007, Fall 2006, Spring 2006, Fall 2005, Fall 2004, Spring 2004, Fall 2003, Spring 2002, Fall 2001, Spring 2001, Fall 2000, Fall 1994, Fall 1991, Spring 1991, Spring 1982, Fall 1981
ME 318 <i>Mechanical Engineering Measurements</i>	Undergraduate	Fall 1982
ME 363 <i>Analysis of Mechanical Engineering Systems</i>	Undergraduate (Discontinued 1998)	Spring 1995, Spring 1991, Fall 1990, Spring 1990, Fall 1989, Spring 1986, Spring 1985, Fall 1984, Fall 1983
ME 428/528 <i>Intermediate Fluid Mechanics</i> (Formerly ME 430)	Undergraduate Technical Elective/ Graduate	Fall 2004, Fall 2000, Fall 1998, Spring 1998, Spring 1997, Spring 1993, Spring 1986, Spring 1985, Spring 1984, Spring 1983, Spring 1982
ME 429/529 <i>Gas Dynamics</i> (some as ME 532, 461/561)	Undergraduate Technical Elective/ Graduate	Spring 2013, Spring 2012, Spring 2008, Fall 2005, Fall 2003 (ITV), Spring 2000 (ITV)
ME 530 <i>Theoretical Fluid Mechanics</i>	Graduate	Fall 2006, Spring 1999 (ITV), Fall 1997, Fall 1996, Fall 1993 (ITV), Fall 1991 (ITV), Fall 1987, Fall 1986, Fall 1985, Fall 1984, Fall 1982
ME 534 <i>Boundary Layers</i>	Graduate	Spring 1999 (ITV), Spring 1994 (ITV), Spring 1992, Spring 1990 (ITV), Spring 1987
ME 634 <i>Turbulence and Turbulent Boundary Layers</i>	Graduate	Spring 2013, Fall 1992, Fall 1990 (ITV), Spring 1988

C. RANDALL TRUMAN

POST-DOCTORAL STUDENTS

Satya Singh, 2008-09, aero-elastic behavior of polymer films for dry powder inhalers

GRADUATE STUDENTS

Ph.D.

Dell Olmstead, planned 2015, PLIF measurements of the development of multiphase flow instabilities

Carrie Noren, 2008, Quantitative Mixing Measurements of a Supersonic Injection COIL Nozzle with Trip Jets (Co-Advisor with Professor Peter Vorobieff)

Andrew Gerhart, 2004, Optical Measurements in Large Scale Buoyant Plumes and Fires

Charles F. Wisniewski, 2003, Spatially Resolved Sub-Doppler Overtone Gain Measurements in a Small Scale Supersonic HF Laser

Timothy Clark, 1991, Spectral Self-Similarity of Homogeneous Anisotropic Turbulence

Siamack Shirazi, 1989, Evaluation of Algebraic and Half-Equation Turbulence Models for Supersonic and Hypersonic Flows Using a Parabolized Navier-Stokes Method

M.S. Thesis

Nyssa Gilkey, planned 2013, prediction of particle resuspension in shock flows

Garrett Kuehner, planned 2013, shock-driven instabilities in multiphase flows

Rachel Delaney, planned 2013, Exploring the Performance of Active Thermal Tiles for Space Applications

Sam Sinnamon, 2012, Coolant Distribution Control In Satellite Structural Panels Using Electrohydrodynamic Conduction Pumping

Melissa Carter, 2011, Effect of an Aeroelastic Film on Confined Subsonic Cavity Resonance

Mario Chavez, 2009, Bioagent Defeat in a Shock-Driven Gas Flow

Christopher Martin, 2008, Modeling of Single Dielectric Barrier Discharge Plasma Actuator in Low-Speed Aerodynamic Flows

Michelle Gallegos, 2008, Flow-Induced Flutter of Thin Elastic Films

Pat Chavez, 2006, Laser Wavefront Diagnostics of a Heated Mixing Layer

Amol Palekar, 2005, Prediction of Chemical Laser Mixing. (Co-Advisor w/ Professor Peter Vorobieff)

Rufus Yazzie, 2004, Prediction of Oscillatory Flow Excitation at the Leading Edge of a Modified NACA 0015 Airfoil

Chris Platero, 2003, Fractal Dimension Evolution in a Shear Layer Instability. (Co-Advisor w/ Professor Peter Vorobieff)

Kathy Meyer, 2003, Planar Laser-Induced Fluorescence (PLIF) of High Speed Mixing Flows. (Co-Advisor w/ Professor Peter Vorobieff)

Peter Szyjka, 2003, Proper Orthogonal Decomposition of Hartmann Wavefront Sensor Data for a Plane Mixing Layer

Jacobo Sapayo, 1997, Study of the Development of Axisymmetric and Helical Modes in Heated Air Jets using Fast Optical Tomography

M.S. Thesis, cont.

Timothy Luna, 1996, Linear Stochastic Estimation in a Heated Round Turbulent Jet

Charles Wisniewski, 1995, Calibration of Constant Current Anemometer Probes for Aircraft Based Atmospheric Turbulence Measurements

Hans Barsun, 1995, Estimating Optical Distortion Imposed on Light Passing Through Turbulent Shear Layers

Brian Staveley, 1994, Optical Investigation of the Turbulent Scales in a Round Jet

Steven Trujillo, 1994, Effects of Regularly Distributed Discrete Roughness on the Saltation Threshold in a Turbulent Boundary Layer

Kris Larson, 1993, Dynamical System Prediction of the Scalar Field in a Near-Wall Turbulent Flow

David Ceman, 1991, Phase Doppler Technique: Factors Affecting Instrument Response and Novel Calibration System

Craig Woolhiser, 1991, A Chlorine Utilization Study for Uniform-Droplet Singlet Delta Oxygen Generators

Timothy Clark, 1988, Optical Propagation Through Computational Turbulence Using a Parabolized Helmholtz Equation

M.S. Project

Rita Rex Smith, 1989, Prediction of Optical Phase Error Induced by a Turbulent Supersonic Mixing Layer

Michael Baxter, 1988, Predicting the Optical Quality of a Supersonic Shear Layer

Hardy Schreiber, 1988, Packed bed Condenser Methodology: Model Development and Enhancement of Ejector Pumping Analysis

Roberto Moya, 1988, Heat Transfer from a Rotating Disk under Turbulent Conditions

Kyle Ross, 1986, LDV calibration and data acquisition

Hossein Sabbagh, 1985, flow visualization in rotating channel

W.-Y. Tang, 1985, heat transfer between rotating disks

Siamack Shirazi, 1983, turbulence model for rotating disks

C. RANDALL TRUMAN

UNDERGRADUATE STUDENT SUPERVISION

Mark Ehrhart, Summer-Fall 2011, BS Honors Thesis, Aeroelastic Flutter of Tensioned Film

Michael Robinson, Summer-Fall 2011, BS Honors Thesis, Computational Modeling of Aeroelastic Polymer Films Subjected to Aeroacoustic Excitation

Patrick Wayne, Summer-Fall 2011, BS Honors Thesis, Study of Shock Wave/Boundary Layer Interactions in a Horizontal and an Inclined Shock Tube

Jason Petty, Fall 2010-Spring 2011, BS Honors Thesis, Acoustic Resonance in Cavity Flow

Michael Stromberg, Fall 2010-Spring 2011, BS Honors Thesis, Aeroelastic Flutter of Thin Film Flag for Dry Powder Inhaler Application

Dustin Scheinert, Summer 2010, Film Flutter in a Pharmaceutical Application

Mark Olguin, Spring 1998, Adaptive Control of Correction for Optical Degradation by Turbulence

Vernon Lawhorn, Spring and Fall 1998, Optical Diagnostics for Wind Tunnel Shear Layer

Victor Soria, Spring-Fall 1998, Prediction of Flow Over Deformable Airfoils

Tyler Wesley, Spring-Fall 1998, Prediction of Flow Over Deformable Airfoils

Jesse Vigil, Spring 1999, Optical Diagnostics for Wind Tunnel Shear Layer

Pat Chavez, Spring-Fall 1999, Optical Diagnostics for Wind Tunnel Shear Layer

Aaron Stone, Summer-Fall 1999, Optical Diagnostics for Wind Tunnel Shear Layer

Zach Smith, Summer 1999-Spring 2000, Optical Diagnostics for Wind Tunnel Shear Layer

Daniel Temer, Fall 1999-Spring 2000, Optical Diagnostics for Wind Tunnel Shear Layer

Chris Box, Spring 2001-Spring 2002, Optical Diagnostics for Wind Tunnel Shear Layer

Roland Ortega, Spring 2001, Optical Diagnostics for Wind Tunnel Shear Layer

Craig Hildreth, Spring 2001-Spring 2002, Optical Diagnostics for Wind Tunnel Shear Layer

Daniel Georgiev, Summer 2000-Spring 2002, PIV Studies in Soap Film Flow (co-advisor w/ Peter Vorobieff)

Jesse Vigil, Fall 2000-Fall 2002, PIV Studies in Soap Film Flow, (co-advisor w/ Peter Vorobieff)

C. RANDALL TRUMAN

HIGH SCHOOL STUDENT SUPERVISION

Through NASA PURSUE

Ben Colahan, Summer 2001, Optical Diagnostics for Wind Tunnel Shear Layer

Savanna Garcia, Summer 2000, Optical Diagnostics for Wind Tunnel Shear Layer

Jason Willis, Summer 1999, Optical Diagnostics for Wind Tunnel Shear Layer

Through NASA Sharp Plus

Emily Dyer, Summer 2004, Drag Reduction with a Superhydrophobic Surface, (co-advisor w/ Peter Vorobieff)

Ben Deaton, Summer 2003, Grid Turbulence in a Two Dimensional Soap Film, (co-advisor w/ Peter Vorobieff)

David Huie, Summer 2002, PIV Studies in Soap Film Flow, (co-advisor w/ Peter Vorobieff)

Fernando Castilo, Summer 2001, PIV Studies in Water Tow Tank, (co-advisor w/ Peter Vorobieff)

Jasmine Sangalang, Summer 2000, PIV Studies in Soap Film Flow, (co-advisor w/ Peter Vorobieff)

Ray Mendoza, Summer 1999, Piping Network for Fluids Lab

High School Internship

Adam Bendorf, Fall 1999-Spring 2000, Optical Diagnostics for Wind Tunnel Shear Layer