

Résumé

Gerald Lee Morrison

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B.S. Mechanical Engineering, Oklahoma State University, 1973.
M.S. Mechanical Engineering, Oklahoma State University, 1974.
Ph.D. Mechanical Engineering, Oklahoma State University, 1977.

Nelson-Jackson Professor of Mechanical Engineering, Texas A&M University, March 1, 1993 to April 2012.

Professor of Mechanical Engineering, Texas A&M University, September 1, 1988 to present.

Associate Director of the Center for Space Power, Texas A&M University, October 1, 1987 to January 15, 1990.

Associate Professor of Mechanical Engineering, Texas A&M University, September 1, 1981 to August 31, 1988.

Assistant Professor of Mechanical Engineering, Texas A&M University, September 1, 1977 to August 31, 1981.

Professional Engineer (Texas No. 46236)

Professional Interests:

- Fluid Mechanics and Heat Transfer
- Multiphase Pumps
- Multiphase Flow Meters
- Erosion
- Turbomachinery
- Computerized Data Acquisition
- Laser Anemometry

Society Memberships:

- Phi Kappa Phi
- Pi Tau Sigma
- Sigma Tau
- Tau Beta Pi
- Associate Fellow, American Institute of Aeronautics and Astronautics
- Fellow, American Society of Mechanical Engineers, Sept. 1996

Honors and Awards:

- Eagle Scout with God and Country Award
- President's Honor Roll, Okla. State Univ.
- Gulf Oil Fellowship
- Halliburton Associate Professor of Mechanical Engineering, 1981-1982
- Texas Engineering Experiment Station Research Fellow, 1983-1984, 1985-1987
- Received a NASA Certificate of Recognition for work on Labyrinth Seals for Incompressible Flow, 1984
- Research Careers for Minority Scholars Program Mentor
- Nelson-Jackson Professorship, 1993-April 2012
- Texas A&M Dept. Mech. Engr. Teaching Award, 1994.
- Texas A&M University Association of Former Students College Level Teaching Award, 1997.
- Texas A&M University Association of Former Students College Level Teaching Award, 2012.
- ASME Henry R. Worthington Medal awarded November 2014

Patent 5295397: "Slotted Orifice Flowmeter" with K.R. Hall and J.C. Holste. Issued March 22, 1994.

Patent 5461932: "Slotted Orifice Flowmeter" with K.R. Hall and J.C. Holste, Issued October 31, 1995.

Patent 6055846: "Method and Apparatus for In Situ Calibration of Gas Flowmeters" with K.R. Hall and J.C. Holste, Issued May 2, 2000.

Patent 6345536B1: "Multiple-Phase Flow Meter" with K.R. Hall and J.C. Holste, Issued February 12, 2002.

Patent 6681189: "Method and System for Determining Flow Rates and/or Fluid Density in Single and Multiple-phase Flows Utilizing Discharge Coefficient Relationships" with K.R. Hall. Issued January 20, 2004.

Provisional Patent Application 61/838954; A Close Coupled Slotted Orifice And Electrical Impedance Sensor Multiphase Flow Meter. Filed June 25, 2013

Patent Application: "Method and System of Multi-Phase Fluid Flow Metering Utilizing Electrical Impedance," Filed June 2014

REVIEWED JOURNAL PUBLICATIONS

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McLaughlin, D.K., Morrison, G.L., and Troutt, T.R., "Reynolds Number Dependence in Supersonic Jet Noise," AIAA Journal. Volume 15, Number 4, April 1977, pp. 526-532.

Morrison, G.L. and McLaughlin, D.K., "The Noise Generation by Instabilities in Low Reynolds Number Supersonic Jets," Journal of Sound and Vibrations. Volume 65, 1979, pp. 177-191.

Morrison, G.L. and McLaughlin, D.K., "The Instability Process in Low Reynolds Number Supersonic Jets," AIAA Journal, Volume 18, Number 7, July 1980, pp. 793-800.

Morrison, G.L. and Whitaker, Kevin, "Axial Wave Number Measurements in Axisymmetric Jets," AIAA Journal, Volume 21, Number 5, May 1983, pp. 788-790.

Morrison, G.L., "Effects of Artificial Excitation Upon a Low Reynolds Number Mach 2.5 Jet," AIAA Journal, Volume 21, Number 6, June 1983, pp. 920-923.

Whitaker, K.W. and Morrison, G.L., "Acoustic Measurements in High Speed Subsonic Jets," AIAA Journal, Vol. 22, Number 6, June 1984, pp. 756-757.

Hsi, R., Tay, M., Bukur, B., Tatterson, G., and Morrison, G., "Sound Spectra of Gas Dispersion in an Agitated Tank", Chemical Engineering Journal, Vol. 31, 1985, pp 153-161.

Rhode, D.L., Demko, J.A., Traegner, U.K., Morrison, G.L. and Sobolik, S.R., "Prediction of Incompressible Flow in Labyrinth Seals," ASME Journal of Fluids Engineering, Vol. 108, March 1986,

pp. 19-25.

Roddy, P.J., Darby, R., Morrison, G.L., and Jenkins, P.E., "Performance Characteristics of a Multiple-Disk Centrifugal Pump," ASME Journal of Fluids Engineering, Vol. 109, No. 1, March 1987, pp. 51-57.

Sutter, T.A., Morrison, G.L., and Tatterson, G.B., "Sound Spectra of Gas Dispersion in an Agitated Tank," AIChE Journal, Vol. 33, No. 4, April 1987, pp. 668-671.

Sheth, K.K., Morrison, G.L., and Peng, W.W., "Slip Factors of Centrifugal Slurry Pumps," ASME Journal of Fluid Engineering, Vol. 109, No. 3, September 1987, pp. 313-318.

Morrison, G.L., Zeineddine, T.I., Henriksen, M., and Tatterson, G., "Experimental Analysis of the Mechanics of Reverse Circulation Air Lift Pump", Industrial Engineering Chemistry Research, Vol. 26, 1987, pp. 387-391.

Usry, W.R., Morrison, G.L., and Tatterson, G.B., "On the Interrelationship between Mass Transfer and Sound Spectra in Aerated Agitated Tanks," Chemical Engineering Science, Vol. 42, No. 7, 1987, pp. 1856-1859.

Tatterson, G.B., and Morrison, G.L., "The Effect of Tank to Diameter Ratio on Flooding Transition for Disc Turbines," AIChE Journal, Vol. 33, No. 10, October 1987, pp. 1751-1753.

Emami, S., Morrison, G.L., and Tatterson, G.B., "Eddy Viscosity Distributions through the Transition of an Incompressible Free Jet," ASME Journal of Fluid Engineering, Vol. 110, March 1988, pp. 98-100.

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Morrison, G.L., Tatterson, G.B., and Long, M.W., "A 3-D Laser Velocimeter Investigation of Turbulent, Incompressible Flow in an Axisymmetric Sudden Expansion," AIAA Journal of Propulsion and Power, Vol. 4, Number 6, November-December 1988, pp. 533-540.

Demko, J.A., Morrison, G.L., and Rhode, D.L., "The Prediction and Measurement of Incompressible Flow in a Labyrinth Seal," ASME Journal of Gas Turbines, Vol. 111, No. 4, 1989, pp. 697-702.

Demko, J.A., Morrison, G.L., and Rhode, D.L., "Effect of Shaft Rotation on the Incompressible Flow in a Labyrinth Seal," AIAA Journal of Propulsion and Power, Vol. 6, No. 2, pp. 171-176, March-April 1990.

Morrison, G.L., DeOtte, R., Panak, D., and Nail, G., "The Flow Field Inside an Orifice Flow Meter," Chemical Engineering Progress, Vol 86, No. 7, pp. 75-80, July 1990.

Morrison, G.L., DeOtte, R.E., Moen, M., Hall, K.R., and Holste, J. C., "Beta Ratio, Swirl, and Reynolds Number Dependence of Wall Pressure in Orifice Flowmeters," Flow Measurement and Instrumentation, Vol. 1, pp. 269-277, October 1990.

Morrison, G.L., Johnson, M.C., and Tatterson, G.B., "3-D Laser Anemometer Measurements in a Labyrinth Seal," ASME Journal of Gas Turbines, Vol. 113, No. 1, pp. 119-125, January 1991.

DeOtte, R.E., Jr., Morrison, G.L., Panak, D.L., and Nail, G.H., "3-D Laser Doppler Anemometry

- Measurements of the Axisymmetric Flow Field in the Vicinity of an Orifice Plate," Flow Measurement and Instrumentation, Vol. 2, April 1991, pp. 115-123.
- Morrison, G.L., Johnson, M.C., Swan, D.H., and DeOtte, Jr., R.E., "Advantages of Orthogonal and Non-Orthogonal 3-D LDA Systems," Flow Measurement and Instrumentation, Vol. 2, April 1991, pp. 89-97.
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- Ha, T.W., Morrison, G.L., and Childs, D.W., "Friction-Factor Characteristics for Narrow Channels with Honeycomb Surfaces," ASME Journal of Tribology, Vol. 114, pp. 714-721, October 1992.
- Morrison, G.L. and Rhode, D.L., "Measured Effect of Step Axial Location On Labyrinth Seal Leakage," AIAA Journal of Propulsion and Power, Vol. 8, No. 6, pp. 1129-1130, November-December 1992.
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- Morrison, G.L., DeOtte, R.E., and Thames, H.D., "Turbulence Measurements of High Shear Flow Fields in a Turbomachine Seal Configuration," ASME Journal of Tribology, Vol. 115, No. 4, October 1993, pp. 670-677.
- Morrison, G.L., Panak, D.L., and DeOtte, R.E., Jr. "Numerical Study of the Effects of Upstream Flow Condition Upon Orifice Flow Meter Performance," ASME Journal of Offshore Mechanics and Artic Engineering, Vol. 115, Nov. 1993, pp. 213-218.
- Morrison, G.L., DeOtte, R.E., Jr., and Thames, H.D., "Experimental Study of the Flow Field Inside a Whirling Annular Seal," STLE Tribology Transactions. Vol. 37, No. 2, 1994, pp. 425-429.
- Morrison, G.L., Johnson, M.C., DeOtte, R.E., Thames, H.D., and Wiedner, B.G., "An Experimental Technique for Performing 3-D LDA Measurements Inside Whirling Annular Seals," Flow Measurement and Instrumentation, Vol. 5, No. 1, 1994, pp. 43-49.
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- Morrison, G.L., Hall, K.R., Holste, J.C., Macek, M.L., Ihfe, L.M., DeOtte, R.E., Jr., and Terracina, D.P., "Comparison of Orifice and Slotted Plate Flowmeters," Flow Measurement and Instrumentation, Vol. 5, No. 2, 1994, pp. 71-77.
- Morrison, G.L., Hall, K.R., Macek, M.L., Ihfe, L.M., DeOtte, R.E., Jr., and Hauglie, J.E., "Upstream Velocity Profile Effects On Orifice Flowmeters," Flow Measurement and Instrumentation, Vol. 5, No. 2, 1994, pp. 87-92.

- Kim, S.Y., Han, J.C., Morrison, G.L., and Elovic, E., "Local Heat Transfer in Enclosed Co-Rotating Disks with Axial Throughflow", ASME Journal of Heat Transfer, Vol. 116, No. 1, Feb. 1994, pp. 66-72.
- Morrison, G.L., Hall, K.R., Holste, J.C., DeOtte, R.E., Jr., Macek, M.L. and Ihfe, L.M., "Slotted Orifice Flowmeter," AIChE Journal, Vol. 40, No. 10, Oct. 1994, pp. 1757-1760.
- Rhode, D.L., Ko, S.H., and Morrison, G.L., "Numerical and Experimental Evaluation of a New Low-Leakage Labyrinth Seal," STLE Tribology Transactions, Vol. 37, No. 4, pp. 1-8, 1994.
- Morrison, G.L., DeOtte, R.E., Jr., Das, P.G., and Thames, H.D., III., "Eccentricity Effects Upon the Flow Field Inside a Whirling Annular Seal," STLE Tribology Transactions, Vol. 38, No. 2, pp. 478-480, 1995.
- Morrison, G.L., Gaharan, C.A., and DeOtte, R.E., Jr., "Doppler Global Velocimetry, Problems and Pitfalls," Flow Measurement and Instrumentation, Vol. 6, No. 2, pp. 83-91, 1995.
- Morrison, G.L., Hauglie, J., and DeOtte, R.E., Jr., "Beta Ratio, Axisymmetric Flow Distortion, and Swirl Effects Upon Orifice Flow Meters," Flow Measurement and Instrumentation, Vol. 6, No. 3, pp 207-216, 1995.
- Morrison, G.L., Winslow, R.B., and Thames, H.D., III., "Phase-Averaged Wall Shear Stress, Wall Pressure, and Near-Wall Velocity Field Measurements in a Whirling Annular Seal," ASME Journal of Engineering for Gas Turbines and Power, Vol. 118, No. 3, pp. 590-597, July 1996.
- Morrison, G.L., Hall, K.H., Holste, J.C., Ihfe, L. Gaharan, C., and DeOtte, R.E., Jr., "Flow Development Downstream of a Standard Tube Bundle and Three Different Porous Plate Flow Conditioners," Flow Measurement and Instrumentation, Vol. 8, No. 2, pp. 61-76, 1997.
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- Morrison, G.L., Schobeiri, M.T., and Pappu, K.R., "Five-Hole Pressure Probe Analysis Technique," Flow Measurement and Instrumentation, Vol. 9, pp. 153-158, 1998.
- Morrison, G.L., Panak, D.L., and DeOtte, R.E., Jr., "Effects of Burst Detection and Analysis Upon Turbulence Measurements for Laser Doppler Anemometry," Flow Measurement and Instrumentation, Vol. 10, Number 4, pp. 217-222, Dec. 1999.
- Wawzyniak, M., Seyed-Yagoobi, J., and Morrison, G.L., "An Experimental Study of Electrohydrodynamic Induction Pumping of a Stratified Liquid/Vapor Medium," Transactions of ASME Journal of Heat Transfer, Vol. 122, pp. 200-203, Feb. 2000.
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- Morrison, G.L., and Gaharan, C.A., Jr., "Uncertainty Estimates in DGV Systems Due to Pixel Location and Velocity Gradients," Measurement Science and Technology, Vol. 12, No.4 (April 2001), pp. 369-377.
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Engineering, Vol. 125, No. 1, pp. 189-191, January 2003.

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Al-Ghasem, Adnan, Morrison, G.L., and Platt, John P., Jr., “Experimental and Numerical Investigation of a Gas Compressor Windback Seal,” ASME J. Tribology, Vol. 129, No. 1, pp. 129-134, January 2007.

Hua, Gong, Gioia Falcone, Catalin Teodoriu, and Gerald Morrison, “Comparison of Multiphase Pumping Technologies for Subsea and Downhole Applications,” SPE Oil and Gas Facilities Journal, pp. 36-46, February 2012.

Morrison, Gerald L., Kroupa, Ryan, Patil, Abhay, Xu, Jun, Scott, Stuart, and Olsen, Sven, “Experimental Investigation of Wellhead Twin-Screw Pump for Gas Well Deliquification,” SPE 159910-PP, SPE Annual Technical Conference and Exhibition, October 8-10, 2012, San Antonio, Texas, USA. Published in SPE Oil and Gas Facilities Journal, Volume 3, Number 2, April 2014.

Pirouzpanah Sahand, Burak Erdogan, and Gerald L. Morrison,” Study of Hysteresis Effects And Emulsion Properties In Watercut Measurement Using High Speed Multi-Frequency Impedance Sensor,” Flow Measurement and Instrumentation. Volume 40, December 2014, pp 1-8.

Pirouzpanah, Sahand, Muhammet Cevik, and Gerald Morrison,” Multiphase Flow Measurements Using Coupled Slotted Orifice Plate and Swirl Flow Meter,” Flow Measurement and Instrumentation, Volume 40, December 2014, pp. 157-161

Chien, Min-Hsiu, Nesrin Ozlap, and Gerald Morrison, “Computational Fluid Dynamics and Heat Transfer Analysis of Vortex Formation in a Solar Reactor,” ASME J. of Thermal Science and Engineering Applications, Vol. 7, December 2015.

Chien, Min-Hsiu, Nesrin Ozlap, and Gerald Morrison, “Effect of Particle Type on Cyclone Formation Inside a Solar Reactor,” Front. Mech. Eng. 2:6. doi: 10.3389/fmech.2016.00006. July 2016.

Pirouzpanah, Sahand, Sujan Reddy Gudigopuran, and Gerald L. Morrison, “Two-phase Flow Characterization in a SVI-ESP Pump,” Journal of Petroleum Science and Engineering 148C (2017) pp. 82-93, DOI information: 10.1016/j.petrol.2016.09.051

Sekaran, Aarthi, Gerald Morrison, and Devesh Ranjan, “An Inquiry of the Friction Factor “Jump” Phenomenon in Hole-Pattern Seals,” ASME Journal of Fluids Engineering, May 2016, 138(8):081102-081102-11.

Gautham Annamalai, Sahand Pirouzpanah, Sujan R. Gudigopuram, Gerald Morrison, “Characterization of Flow Homogeneity Downstream of a Slotted Orifice Plate in a Two-Phase Flow Using Electrical Resistance Tomography” J. Flow Measurement and Instrumentation, 25-Aug-2016 pp. 209-215, doi:10.1016/j.flowmeasinst.2016.07.003.

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Submitted

Abhay Patil and Gerald Morrison, “Performance of Multiphase Twin-Screw Pump during the Period of

Wet Gas Compression” SPE Journal- Production and Operation

Liu, P., Patil, A., and Morrison, G., “Multiphase Flow Performance Prediction Model for Twin-Screw Pump” ASME Journal of Fluid Engineering.

EDITOR

Third International Symposium on Laser Anemometry, ASME Publication FED-Vol. 55, December 1987. Edited by A. Dybbs, F. Ali, and G. Morrison.

Fluid Measurement and Instrumentation 1994, ASME Publication FED-Vol 183. ISBN No. 0-7918-1366-5, Edited by T.B. Morrow, G.L. Morrison, and R.A. Gore.

Fluid Measurements & Instrumentation 1995. ASME Publication FED-Vol. 211. ISBN No. 0-7918-1466-1, Edited by G.L. Morrison, M. Nishi, T.B. Morrow, and R.A Gore.

Fluid Measurements & Instrumentation 1996. ASME Publication FED-Vol. 239. ISBN No. 0-7918-1794-6, Edited by G.L. Morrison and R.J. McKee.

Fluid Measurements and Instrumentation 1997. On ASME CD-ROM No. I400CD. ISBN No. 0-7918-1237-5, Edited by G.L. Morrison and R.J. McKee.

Fluid Flow Metering 1997. On ASME CD-ROM No. I400CD. ISBN No. 0-7918-1237-5, Edited by G.L. Morrison, R.J. McKee, J. Gregor.

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TEXTBOOKS

Morrison, G.L., Fluid Mechanics Laboratory, August 1992, Self Published.

VIDEOS

Morrison, G.L. and Hendricks, R., "Flow Inside a Whirling Annular Seal," Published by NASA Lewis Research Center, 1993.

ASME Professional Development Programs - Fundamentals of Engineering Exam: ASME Video Review Program - Mechanical Engineering (Discipline-Specific) Topics - Afternoon Exam. Wrote section on Fans, Pumps and Compressors and recorded a 50 minute video.

CONFERENCE PUBLICATIONS

Conference Publications, Refereed

Rhode, D.L., Demko, J.A., Traegner, U.K., Morrison, G.L. and Sobolik, S.R., "On the Prediction of Incompressible Flow in Labyrinth Seals," Presented at the 7th Annual Energy-Sources Technology Conference, New Orleans, February 12-16, 1984.

Morrison, G.L. and Chi, Daesung, "Incompressible Flow in Stepped Labyrinth Seals," ASME Paper No. 85-FE-4. Presented at the 1985 ASME Fluids Engineering Conference, Albuquerque, New Mexico, June

1985.

Peng, W.W., Sheth, K., and Morrison, G.L., "Slip Factors of Centrifugal Slurry Pumps," ASME International Symposium of Slurry Flows, FED-Vol. 38. Presented at the 1986 ASME International Symposium on Slurry Flows.

Morrison, G.L., Johnson, M.C., and Tatterson, G.B., "3-D Laser Anemometer Measurements in a Labyrinth Seal," ASME Paper 88-GT- 63. Presented at the 33rd ASME International Gas Turbine and Aeroengine Congress and Exposition, Amsterdam, The Netherlands, June 1988.

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Emami, S., and Morrison, G.L., "Spectral Cascade and Phase Distribution of Coherent Structure in an Incompressible Circular Jet," AIAA Paper No. 88-3704-CP. Presented at the First National Fluid Dynamics Congress, Cincinnati, Ohio, July 1988.

Rhode, D.L., Ko, S.H., and Morrison, G.L., "Design Optimization and Testing of a Pump Wear Ring Labyrinth Seal," AIAA Paper No. 88-3693-CP. Presented at the First National Fluid Dynamics Congress, Cincinnati, Ohio, July 1988.

Morrison, G.L., Johnson, M.C., and Tatterson, G.B., "Experimental Verification of a Secondary Recirculation Zone in a Labyrinth Seal," AIAA Paper No. 88-3692-CP. Presented at the First National Fluid Dynamics Congress, Cincinnati, Ohio, July 1988.

Morrison, G.L., DeOtte, R.E., Panak, D., and Nail, G., "3-D Laser Doppler Measurements of the Flow Field Inside an Orifice Flowmeter," Paper No. 51D presented at the AIChE 1989 Spring National Meeting, Houston, Texas, April 1989.

Morrison, G.L., Johnson, M.C., and DeOtte, R.E., Jr., "Experimental Investigation of an Eccentric Labyrinth Seal Velocity Field Using 3-D Laser Doppler Anemometry," Presented at the 1990 ASME Winter Annual Meeting, Dallas, Texas, November 1990, FED-Vol. 101, Fluid Machinery Components Book No. G00558, pp. 61-71

Morrison, G.L., DeOtte, R.E., Jr., Nail, G.H., and Panak, D.L., "Mean Velocity Field and Turbulence Characterization of the Flow in an Orifice Flow Meter," Presented at the Fourth International Conference on Laser Anemometry, Advances and Applications, Cleveland, Ohio, August 1991. Published in Laser Anemometry Advances and Applications - 1991- by ASME. Edited by A. Dybbs and B. Ghorashi.

DeOtte, R.E., Jr., Morrison, G.L., Weidner, B.G., Panak, D.L., Nail, G.H., and Johnson, M.C. "Laser Alignment and Stability in 3-D Laser Doppler Anemometry," Presented at the Fourth International Conference on Laser Anemometry, Advances and Applications, Cleveland, Ohio, August 1991. Published in Laser Anemometry Advances and Applications - 1991- by ASME. Edited by A. Dybbs and B. Ghorashi.

Ha, T.W., Morrison, G.L., and Childs, D.W., "Friction-Factor Characteristics for Narrow Channels with

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Morrison, G.L., Panak, D.L., and DeOtte, R.E., Jr. "Numerical Study of the Effects of Upstream Flow Condition Upon Orifice Flow Meter Performance," Presented at the ASME 11th International Conference on Offshore Mechanics and Arctic Engineering, Calgary, Alberta, Canada, June 7-11, 1992.

Kim, S.Y, Han, J.C., and Morrison, G.L., "Influence of Surface Heating Condition on Local Heat Transfer in Enclosed Corotating Disks with Axial Throughflow," Presented at the 38th ASME International Gas Turbine & Aeroengine Congress & Exposition, May 24-27, 1993, Cincinnati Ohio, ASME Paper No. 93-GT-258.

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Morrison, G.L., Panak, D.L., and DeOtte, R.E., Jr., "Effects of Burst Detection and Analysis Upon Turbulence Measurements," Presented at the 1995 ASME Fluids Engineering Division Summer Meeting, August 13-18, 1995, Hilton Head Island, South Carolina.

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Robic, B. and Morrison, G., "Experimental Analysis of the Effect of Swirl on the Pressure Field in Whirling 50% Eccentric Annular Seal," Proceedings of the ASME IGTI TURBO EXPO 2000, Paper 2000-GT-0286, Munich, Germany, May 8-11, 2000.

Al-Ghasem, Adnan, Morrison, G.L., and Platt, John P., Jr., "Experimental and Numerical Investigation of a Gas Compressor Windback Seal," Proceeding of the ASME/STLE International Joint Tribology Conference, Paper IJTC2006-12109, San Antonio, Texas, USA, October 23-25, 2006.

Morrison, G.L., and Al-Ghasem, Adnan, "Experimental and Computational Analysis of a Gas Compressor Windback Seal," Proceedings of the ASME Turbo Expo 2007, Paper GT2007-27986, Montreal, Canada, May 14-17, 2007.

Suryanarayanan, S, and G.L. Morrison, "Effect of Flow Parameters on Carry over Coefficient of Labyrinth Seals," Paper No GT2009-59245, Proceedings of the ASME Turbo Expo 2009, June 8-12, 2009, Orlando, Florida, USA.

Suryanarayanan, S, and G.L. Morrison, "Effect of Tooth Width, Height, Pitch and Shaft Diameter on Carry over Coefficient of Labyrinth Seals," Paper No GT2009-59246, Proceedings of the ASME Turbo Expo 2009, June 8-12, 2009, Orlando, Florida, USA.

Park, S.H, and G.L. Morrison, "Centrifugal Pump Pressure Pulsation Prediction Accuracy Dependence," Paper No FEDSM2009-78184, Proceedings of the 2009 ASME Fluids Engineering Conference, August 2-5, 2009, Vail, Colorado, USA.

Park, S.H, and G.L. Morrison, "Analysis of the Flow Between the Impeller and Pump Casing Back Face," Paper No FEDSM2009-78185, Proceedings of the 2009 ASME Fluids Engineering Conference, August 2-5, 2009, Vail, Colorado, USA.

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Morrison, Gerald, "Multiphase Pump Characterization and Evaluation," Multiphase Pump Users Roundtable, May 3, 2012.

SHORT COURSE

Morrison, Gerald, "Multiphase Pump Tutorial," Day long course presented at the Multiphase Pump User Roundtable, November 8, 2010, Bogota, Columbia.

Morrison, Gerald, "Multiphase Pump Tutorial," Day long course presented at the Multiphase Pump Users Roundtable, March, 2011, The Hague, Netherlands.

FUNDED RESEARCH

Morrison, G.L., "Instability Measurements in High Speed Subsonic Jets," Submitted to the National Science Foundation, November 1978. Funded, \$32,000.00 from April 15, 1979 to April 14, 1981.

Morrison, G.L., "The Role of Coherent Structures in the Generation of Noise for Subsonic Jets," Submitted to NASA Langley Research Center, February 1980. Funded, \$38,556.00 from November 1, 1980 to October 31, 1981.

Morrison, G.L., "Labyrinth Seals for Incompressible Flow," Submitted to NASA Marshall Space Flight Center, May 1981. Funded, \$223,745.00 from October 1, 1981 to February 28, 1984.

Morrison, G.L., "The Role of Coherent Structures in the Generation of Noise for Subsonic Jets," Submitted to NASA Langley Research Center, June 1981. Funded, \$46,930.00 from November 1, 1981 to October 31, 1982.

Morrison, G.L., "The Role of Coherent Structures in the Generation of Noise for Subsonic Jets," Submitted to NASA Langley Research Center, July 1982. Funded, \$49,993 from November 1, 1982 to April 30, 1984.

Morrison, G.L., "Computer Controlled Laser Doppler Anemometer Data Acquisition and Analysis System," Submitted to Digital Equipment Corporation, Hudson, Mass. May 1983. Proposal resulted in a savings of \$13,541.00 on a \$53,638.00 (list price) PDP 11/23+ computer system purchased for the 3-D laser anemometer system.

Morrison, G.L. (PI), Childs, Dara (Co-PI), and Rhode, David (Co- PI), "DoD University Equipment Grant Proposal," Submitted to the Department of Defense, November 1982. Funded, \$222,078 from July 15, 1983 to July 15, 1984 to purchase a 3-D laser velocimeter system.

Childs, D.W. (Co-PI), Rhode, D.L. (Co-PI), and Morrison, G.L. (Assoc. Investigator), "Rotordynamic Forces Developed by Labyrinth Seals," Submitted to the Air Force Office of Scientific Research, March 1984, Funded, \$139,319.00 from September 1, 1984 to August 31, 1985. Renewed, \$194,437.00 from September 1, 1985 to August 31, 1986. Renewed, \$178,000.00 from September 1, 1986 to August 31, 1987.

Rhode, D.L. (Co-PI) and Morrison G.L. (Co-PI), "Labyrinth Seals for Incompressible Fluids," Submitted

to the NASA Marshall Space Flight Center, June 1984, Funded, \$114,704.00 from November 1, 1984 to June 1, 1986.

Childs, D.W.(Co-PI), Nelson, C.C.(Co-PI), and Morrison, G.L. (Co- PI), "Analysis Techniques for Compressible-Fluid Seals," Submitted to NASA Lewis Research Center, November 1984, Funded, \$200,000.00 from March 1, 1985 to February 28, 1986.

Tatterson, G.B. and Morrison, G.L., "The Assessment of Gas Dispersion In Agitated Tanks Using Sound: Equipment Only," Submitted to the National Science Foundation, April 1985. Funded, \$9,228.00 from September 1, 1985 to February 28, 1987.

Morrison, G.L. (PI), "Rectangular Subsonic Jet Flowfield Study," Submitted to the NASA Langley Research Center, August 1985. Funded, \$53,926.00 from January 1, 1986 to December 31, 1986.

Childs, D.W.(Co-PI), Nelson, C.C.(Co-PI), and Morrison, G.L. (Co- PI), "Analysis Techniques for Compressible-Fluid Seals," Submitted to NASA Lewis Research Center, November 1985, Funded, \$205,000.00 from March 1, 1986 to February 28, 1987.

Morrison, G.L.(PI), Hall, K.R.(Co-PI), and Holste, J.C.(Co- PI),"3-D Laser Anemometer Study of Compressible Flow Through Orifice Plates," Submitted to the Gas Research Institute, September 1985, Funded, \$401,713.00 from September 1, 1986 to August 31, 1989.

Morrison, G.L. (PI), "Rectangular Subsonic Jet Flowfield Study," Submitted to the NASA Langley Research Center, September 1986. Funded, \$55,000.00 from February 1, 1987 to January 31, 1988. Tatterson, G.B. and Morrison, G.L., "An Investigation Into the 3- 3 Cavity Structure and Sparger Maldistribution in an Aerated Agitated Tank Using Hydrophones with Application to Agitated Tank Fermentation," Submitted to TEES under the Undergraduate Summer Research Program, April 1986. Funded.

Tatterson, G.B. (PI) and Morrison, G.L. (Co-PI), "An Investigation into the Use of Sound Spectra to Monitor Gas Dispersion and Mass Transfer in Aerated Agitated Tanks," Submitted to the National Science Foundation, September 1986. Funded, \$74,000.00 from April 1, 1987 to March 31, 1989.

Morrison, G.L., "Two Spot Laser Anemometer," Submitted to Texas A&M University System, January 1987. Funded, \$269,000.00.

Childs, D. (Co-PI), Nelson, C. (Co-PI), and Morrison, G. (Co-PI), "Compressible and Incompressible Fluid Seals: Influence on Rotordynamic Response and Stability," Submitted to NASA Lewis Research Center, March 1987. Funded, \$234,881.00 from March 1, 1987 to April 30, 1988.

Tatterson, G.B., and Morrison, G.L., "The Use of Sound Data to Assess Gas Dispersion in Agitated Tanks, Undergraduate Summer Research Proposal," Submitted to the Texas Engineering Experiment Station, March 1987. Funded.

Morrison, G.L. (P.I.), "Rectangular Subsonic Jet Flowfield Study," Submitted to the NASA Langley Research Center, November 1987. Funded, \$54,919.00 from February 1, 1988 to April 30, 1989.

Childs, D. (Co-PI), Nelson, C. (Co-PI), and Morrison, G. (Co-PI), "Compressible and Incompressible Fluid Seals: Influence on Rotordynamic Response and Stability," Submitted to NASA Lewis Research Center, January 1988. Funded, \$230,469.00 from June 1, 1988 to April 29, 1989.

Childs, D. (Co-PI), Nelson, C. (Co-PI), and Morrison, G. (Co-PI), "Compressible and Incompressible Fluid Seals: Influence on Rotordynamic Response and Stability," Submitted to NASA Lewis Research Center, January 1989. Funded, \$250,000.00 from June 1, 1989 to April 29, 1990.

DeOtte, R.E. and Morrison, G.L., "Velocity Fields in Centrifugal Pumps," Submitted to the Turbomachinery Research Consortium, March 1989. Funded, \$14,790.00 from July 1, 1989 to June 30, 1990.

Morrison, G.L. and DeOtte, R.E., "Experimental Investigation of an Ejector Flow Field Using 3-D Laser Doppler Velocimetry," Submitted to General Dynamics, December 1988. Funded, \$80,646.00 from February 1, 1989 to May 30, 1990.

Morrison, G.L. and DeOtte, R.E., "3-D Laser Anemometer Study of Compressible Flow Through Orifice Plates," Submitted to the Gas Research Institute, June 1989. Funded, \$349,958.00 from December 1989 to December 1992.

Childs, D. (Co-PI), Nelson, C. (Co-PI), and Morrison, G. (Co-PI), "Compressible and Incompressible Fluid Seals: Influence on Rotordynamic Response and Stability," Submitted to NASA Lewis Research Center, January 1990. Funded, \$250,000.00 from May 1, 1990 to April 29, 1991.

Morrison, G.L. and DeOtte, R.E., Jr., "3-D LDV Study of the Effects of Whirl Upon the Velocity Field in a Labyrinth Seal," Submitted to the Turbomachinery Research Consortium, March 1990. Funded, \$15,000.00 from August 1990 to July 1991.

DeOtte, R.E., Jr., and Morrison, G.L., "Velocity Fields in a Centrifugal Pump with a Flat Closed Face Impeller," Submitted to the Turbomachinery Research Consortium, March 1990. Funded, \$15,000.00 from August 1990 to July 1991.

DeOtte, R.E., Jr., and Morrison, G.L., "Determination of the Friction Factors in Channel Flow for Various Roughness Types," Funded jointly by the Center for Space Power for \$30,000.00 and Rockwell International/Rocketdyne Division for \$67,000.00 from July 1990 to July 1991.

Childs, D.W. and Morrison, G.L., "Compressible and Incompressible Fluid Seals: Influence on Rotordynamic Response and Stability," Submitted to the NASA Lewis Research Center, April 1991. Funded, \$115,000.00 from May 1, 1991 to December 31, 1991.

DeOtte, R.E. Jr., and Morrison, G.L., "Velocity Fields in Centrifugal Pumps," Submitted to the Turbomachinery Research Consortium, April 1991. Funded, \$15,000.00 from June 1991 to May 1992.

Morrison, G.L., and DeOtte, R.E. Jr., "3-D LDV Study of the Effects of Whirl Upon the Velocity Field in a Labyrinth Seal," Submitted to the Turbomachinery Research Consortium, April 1991. Funded, \$15,000.00 from June 1991 to May 1992.

Childs, D.W., and Morrison, G.L., "Compressible and Incompressible Fluid Seals: Influence on Rotordynamic Response and Stability," Submitted to the NASA Lewis Research Center, November 1991. Funded for \$175,000.00 from December 16, 1991 to December 15, 1992. Supplemental funding \$15,000.00 to purchase pressure and shear stress instrumentation (for Dr. Morrison), June 1992.

Morrison, G.L., "Slotted Orifice Flow Meter," Submitted to the Texas Advanced Technology Program, July 1991. Funded, \$139,650.00 from February 1992 to January 1994.

Morrison, G.L., Hall, K.R., and Holste, J.C., "A Slotted Orifice Flowmeter," Submitted to the Gas

Research Institute, October 1991. Funded, \$120,256.00, from July 1993 to June 1994.

Morrison, G.L., and DeOtte, R.E. Jr., "3-D LDV Study of the Effects of Whirl Upon the Velocity Field in a Labyrinth Seal," Submitted to the Turbomachinery Research Consortium, April 1992. Funded, \$15,000.00 from June 1992 to May 1993.

DeOtte, R.E. Jr., and Morrison, G.L., "Investigation of Friction Factors and Pressure Responses for Surface Treatments in Hydrostatic Bearings and Seals," Submitted to the Turbomachinery Research Consortium, April 1991. Funded, \$15,000.00 from June 1992 to May 1993.

DeOtte, R.E., Jr., and Morrison, G.L., "Velocity Fields in Centrifugal Pumps," Submitted to the Turbomachinery Research Consortium, April, 1992, Funded, for \$15,000.00 from June 1992 to May 1993. Co-Funded by the Center for Space Power for \$4,500.00.

Childs, D.W. and Morrison, G.L., "Compressible and Incompressible Fluid Seals: Influence on Rotordynamic Response and Stability," Funded by NASA Lewis Research Center, March 1, 1993 -to February 28, 1994 for \$145,000.00.

Morrison, G.L. and DeOtte, R.E., Jr., "3-D Laser Anemometer Study of Compressible Flow Through Orifice Plates," Submitted to the Gas Research Institute, Funded from January 1, 1993 to June 30, 1994 for \$119,800.00.

Morrison, G.L., and DeOtte, R.E. Jr., "3-D LDV Study of the Effects of Whirl Upon the Velocity Field in a Labyrinth Seal," Submitted to the Turbomachinery Research Consortium, April 1993. Funded, \$15,000.00 from June 1993 to May 1994.

DeOtte, R.E., Jr., and Morrison, G.L., "Velocity Fields in Centrifugal Pumps," Submitted to the Turbomachinery Research Consortium, April, 1993, Funded, for \$15,000.00 from June 1993 to May 1994. Co-Funded by the Center for Space Power for \$4,500.00.

Morrison, G.L., "3-D LDV Study of the Effects of Whirl Upon the Velocity Field in a Labyrinth Seal," Submitted to the Turbomachinery Research Consortium, April 1994. Funded, \$15,000.00 from June 1994 to May 1995.

Morrison, G.L., "Flow Fields In Turbomachinery Labyrinth Seals," Exxon Education Foundation Grant, \$30,000, August 1993 - July 1996.

Morrison, G.L., Hall, K.R., and Holste, J.C., "A Slotted Orifice Flowmeter," Submitted to the Gas Research Institute, July 1994. Funded, \$48,000 from September 1994 to August 1995.

Morrison, G.L., "Sonic Nozzle Bank Design," Flow Systems, Inc., Funded, \$50,000 from June 1995-May 1996.

Morrison, G.L., "Dynamic Pressure and Shear Stress Measurements on the Stator Wall of Whirling Seals," Submitted to the Turbomachinery Research Consortium, May 1995, \$15,000.00. Funded, June 1995-May 1996.

Morrison, G.L., "Numerical Simulation of Orifice Meter Upstream Effects," Submitted to Southwest Research Institute, June 1995, \$35,000.00. Funded, August 1995-May 1996.

Morrison, G.L., "Multimedia Teaching & Learning System - Fluid Mechanics Laboratory", This proposal

which was funded utilized funding from four sources: \$3,300 from the Mechanical Engineering Department, \$3,000 from the Texas A&M University Honors Program, \$8,000 from the Texas A&M University College of Engineering Common Equipment Pool, and \$7,500 from the Texas A&M University Computing and Information Systems. Competitive (on the last two parts), July 1996. Funded \$21,800.

Morrison, G.L., "Multiple Phase Flow Meters," AMF Licensing Co., LLC, Funded \$11,500 from January 1996 to December 1996.

Morrison, G.L., "Dynamic Pressure and Shear Stress Measurements on the Stator Wall of Whirling Labyrinth and Annular Seals," Submitted to the Turbomachinery Research Consortium, May 1996, \$15,000.00. Funded, June 1996-May 1997.

Morrison, G.L., "Numerical Simulation of Orifice Meter Upstream Effects," Submitted to Southwest Research Institute, October, 1996, Funded \$38,000.

Morrison, G.L., "Numerical Simulation of Orifice Meter Upstream Effects," Submitted to Southwest Research Institute, April, 1997, \$62,406, Funded June 1, 1997 to August 31, 1998.

Morrison, G.L., "ND-YAG Laser Cost Sharing for DGV System," TEES \$15,000, Mechanical Engineering Department \$5,000, and G.L. Morrison \$32,000. 1997.

Morrison, G.L. (PI) and Hall, K.R. (Co-PI), "Two Phase Flow Meter Development," Submitted to AMFund, L.C. April 1997, \$100,168. Funded, September 1997 to August 1998.

Morrison, G.L., "Dynamic Pressure and Shear Stress Measurements on the Stator Wall of Whirling Labyrinth and Annular Seals," Submitted to the Turbomachinery Research Consortium, May 1997, Funded, \$20,000.

Morrison, G.L., "Dynamic Loading for Open Faced Impellers," Submitted to the Turbomachinery Research Consortium, May 1997, Funded, \$20,000 with an additional cost share of \$40,000 from the Turbomachinery Laboratory for Facility Development.

Morrison, G.L. (PI) and Hall, K.R. (Co-PI), "Multi-Phase Flow Meter", Submitted to the Advanced Technology Program, State of Texas, July 1997 for \$182, 083. Rosemount Inc. and AMFund, L.C. will match the state contribution with an additional \$182, 083. Funded by Texas for \$180,262, "MFund, L.C. will match that with another \$180,262 for January 1998 to December 1999.

Morrison, G.L., "Effects of Pipe Wall Roughness Upon Orifice and Ultrasonic Flow Meters," Submitted to Southwest Research Institute (GRI subcontract), August 1998 for \$42,705. Funded for September 1998 to October 1999.

Morrison, G.L., "Experimental Investigation of the Flow Field Inside a Centrifugal Compressor Operating Near Surge", submitted to the Turbomachinery Research Consortium, May 1998, Funded, \$20,000 with a \$20,000 match from the Turbomachinery Laboratory.

Morrison, G.L., "Dynamic Loading for Open Faced Impellers," Submitted to the Turbomachinery Research Consortium, May 1998, Funded, \$20,000 with a \$20,000 match from the Turbomachinery Laboratory.

Morrison, G.L., "Dynamic Pressure Measurements and Computer Simulations of the Flow Inside Whirling Labyrinth and Annular Seals," Submitted to the Turbomachinery Research Consortium, May

1998. Funded, \$20,000.

Morrison, G.L., "Experimental and Computational Investigation of the Rotor-Stator Interaction Inside an Axial Flow Fan," Submitted to the Turbomachinery Research Consortium, May 1998. Funded, \$20,000.

Morrison, G.L., "Experimental Investigation of the Flow Field Inside a Centrifugal Compressor Operating Near Surge", submitted to the Turbomachinery Research Consortium, May 1999, Funded, \$20,000.

Morrison, G.L., "Dynamic Loading for Open Faced Impellers," Submitted to the Turbomachinery Research Consortium, May 1999, Funded, \$20,000.

Morrison, G.L., "Benchmark Testing and Verification of EPRI Wetness Probe for LPT Testing," Submitted to the Tennessee Valley Authority, October, 1999. Funded, \$75,732.71.

Morrison, G.L., "Wall Pressure Distribution for Statically Eccentric Labyrinth and Annular Seals," Submitted to the Turbomachinery Research Consortium, May 2000. Funded, \$20,000.

Morrison, G.L., "Experimental Investigation of the Flow Field Inside a Centrifugal Compressor Operating Near Surge", submitted to the Turbomachinery Research Consortium, May 2000, Funded, \$20,000.

Morrison, G.L., "Wall Pressure Distribution for Statically Eccentric Labyrinth and Annular Seals," Submitted to the Turbomachinery Research Consortium, May 2001. Funded, \$20,000.

Morrison, G.L., "Low Cost, High Accuracy Slotted Orifice Multi-Phase Flow Meter," Submitted to the State of Texas Advanced Technology Program (\$99,900) and Flowline Meters (\$100,000), July 2001, Funded, \$190,000.

Morrison, G.L., "Wall Pressure Distribution for Statically Eccentric Labyrinth and Annular Seals," Submitted to the Turbomachinery Research Consortium, May 2002. Funded, \$20,000.

Morrison, G.L., "Dynamic Loading for Open Faced Impellers," Submitted to the Turbomachinery Research Consortium, May 2002, Funded, \$20,000.

Morrison, G.L., "Wall Pressure Distribution for Statically and Dynamically Eccentric Labyrinth and Annular Seals," Submitted to the Turbomachinery Research Consortium, May 2003. Funded, \$20,000

Morrison, G.L., "CFD Evaluation of Pipeline Gas Stratification At Low Flow Due To Temperature Affects," Submitted to the Gas Research Institute, August 2003, Funded, \$30,000.

Morrison, G.L., "Wall Pressure Distributions for Statically and Dynamically Eccentric Labyrinth and Annular Seals," Submitted to the Turbomachinery Research Consortium, May, 2004. Funded, \$22,000

Morrison, G.L., "Evaluation of Windback Seals," Submitted to BP America Production Co., Spring 2005, Funded, 6/05 to 5/06, \$173,520.00.

Morrison, G.L., "Wall Pressure Distributions for Statically and Dynamically Eccentric Labyrinth and Annular Seals," Submitted to the Turbomachinery Research Consortium, May, 2005. Funded, \$25,000

Morrison, G.L., "Wall Pressure Distributions for Statically and Dynamically Eccentric Labyrinth and Annular Seals," Submitted to the Turbomachinery Research Consortium, May, 2006. Funded, \$25,000

G. L. Morrison, "Effect of Orbit Path Upon Flow Inside a Whirling Seal and the Rotordynamic Coefficients," Submitted to the Turbomachinery Research Consortium, May 2007 for \$35,000. Funded.

G. L. Morrison, "Numerical Simulation of the Flow Inside Squeeze Film Dampers," Submitted to the Turbomachinery Research Consortium, May, 2008. Funded, \$39,000.

G. L. Morrison, "Improved Leakage Prediction Algorithm for Labyrinth Seals," Submitted to the Turbomachinery Research Consortium, May, 2008. Funded, \$40,000.

G. L. Morrison, "Effect of Orbit Path Upon Flow Inside a Whirling Seal and the Rotordynamic Coefficients," Submitted to the Turbomachinery Research Consortium, May, 2008. Funded, \$39,000.

G. L. Morrison, "Gas Measurement Compendium," Submitted to Colorado Engineering Experiment Station (CEESI), June 2008, Funded \$58,595.

G.L. Morrison, "Progressive Cavity Multiphase Pump," Submitted to Shell Exploration & Production Co., June 2009 to August 2013, Funded \$530,000.

G. L. Morrison, "Effect of Orbit Path Upon Flow Inside a Whirling Seal and the Rotordynamic Coefficients," Submitted to the Turbomachinery Research Consortium, May, 2009. Funded, \$24,291.

G. L. Morrison, "Convergent Tapered Seals," Submitted to the Turbomachinery Research Consortium, May, 2009 to August 2012. Funded, \$73,200.

G. L. Morrison, "Numerical Simulation of the Flow Inside Squeeze Film Dampers," Submitted to the Turbomachinery Research Consortium, May, 2009. Funded, \$20,282.

G. L. Morrison, "Improved Leakage Prediction Algorithm for Labyrinth Seals," Submitted to the Turbomachinery Research Consortium, May, 2009 to August 2012. Funded, \$63,188.

G. L. Morrison, "Flat Plate Friction Test Results Analysis," Submitted to the Turbomachinery Research Consortium, October 2009 to August 2012. Funded, \$37,000.

G.L. Morrison, "Evaluation of the Flow Field Inside the MVP G470 Pump," Submitted to Shell, Funded, May, 2010 to August 2013, \$1,860,520.

Ozalp, Nesrin (PI), Morrison, G.L.(Co-PI), "Emission Free Co-Production of Carbon Nanotubes and Hydrogen Via Concentrated Solar Energy," Submitted to Qatar National Research Fund – OSS, January 2010 for \$968,392.

G.L. Morrison, "New Labyrinth Seal Design for Small Clearances," Submitted to the Turbomachinery Research Consortium, December 2011 to August, 2012, Funded \$40,000.

G.L. Morrison, "ESP Pump Evaluation Studies", Proposal 13-11672 submitted to Shell, May 1, 2013 to December 31, 2013, Funded for \$589,434.00.

G.L. Morrison, "Evaluation of a Can-K Twin Screw Multiphase Pump", Proposal 13-13132 submitted to Shell Canada, May 1, 2013 to December 31, 2013, Funded for \$243,636.00.

G.L. Morrison, "Erosion Testing of a Schumberger/Reda Poseiden ESP", Proposal 13-15737 submitted to Shell, September 1, 2013 to December 31, 2013, Funded for \$100,000.00.

G.L. Morrison, "Multiphase Flow Meter", Proposal 14-00964 submitted to Shell, January 1, 2014 to December 31, 2014, Funded for \$100,000.00.

G.L. Morrison, "Curtis Wright Canned Pump," Proposal 14-01021 submitted to Shell, January 1, 2014 to December 31, 2014, Funded for \$750,000.00.

G.L. Morrison, "Twin Screw Pump Analysis," Proposal 14-01020 submitted to Shell, January 1, 2014 to December 31, 2014, Funded for \$100,000.00.

G.L. Morrison, "Evaluation of a Can-K Twin Screw Multiphase Pump," Proposal 14-02238 submitted to Shell Canada, January 1, 2014 to May 31, 2014, Funded for \$67,882.00.

G.L. Morrison, "Evaluation of a Can-K Twin Screw Multiphase Pump," Proposal 15-00860 submitted to Shell Canada, October 2014 to Oct 2015, Funded for \$148,136.00.

G.L. Morrison, "Performance and Erosion Evaluation of a Poseidon Pump," Proposal 14-03724 submitted to Shell, January 1, 2014 to December 31, 2014, Funded for \$275,000.

G.L. Morrison, "Development of an ESP Bearing Erosion Apparatus," Proposal 14-06013 submitted to Shell, September 2014 to December 2014, Funded for \$194,596.00.

G.L. Morrison, "Evaluation of the Flow Field Inside the MVP G470 Pump," Proposal 14-00832 Submitted to Shell, Funded, October 2014 to December 2014, Funded for \$200,000.00.

G.L. Morrison, "Modification of Multiphase Test Loop to Use Oil," Proposal 15-01212 submitted to Shell, October 2014 to December 2014, Funded for \$148,000.00

G.L. Morrison, "Evaluation of a Can-K Twin Screw Multiphase Pump Using Oil," Proposal 15-00860, submitted to Shell, January 2015 to Jun 2015, Funded for \$148,136.00.

G.L. Morrison, "Curtiss Wright Canned Pump Performance in Oil and Sand Erosion," Proposal 15-02191, submitted to Shell, January 2015 to December 2015, Funded for \$210,000.00.

G.L. Morrison, "Multiphase Pump Performance in Oil and Gas," Proposal 15-04641, submitted to Shell, June 2015 to May 2016, Funded for \$286,117.00.

G.L. Morrison, "Bearing Erosion Study," Proposal 1603771, submitted to Shell Oil Company, Feb 24, 2016 to August 31, 2017, Funded for \$199,999.00

G.L. Morrison, "UDV Project," Proposal 1604764, submitted to Shell Oil Company, April 1, 2016 to August 31, 2017, Funded for \$15,000.00

G.L. Morrison, "UDV Project," Proposal 1603761, submitted to Shell Oil Company, April 1, 2016 to August 31, 2017, Funded for \$50,000.00

GRADUATE STUDENT SUPERVISION

DOCTOR OF PHILOSOPHY DISSERTATIONS, G.L. MORRISON COMMITTEE CHAIRMAN

Complete

Demko, Jonathan, (Co-Chairman), "The Numerical Prediction and Experimental Measurement of Incompressible Flow Through Labyrinth Seals," May 1986, Mechanical Engineering Department, Texas A&M University.

Emami, Saied, "Turbulence Characteristics of an Incompressible Free Jet Under the Influence of Acoustic Disturbances," May 1988, Mechanical Engineering Department, Texas A&M University.

Johnson, Mark, "Development of a 3-D Laser Doppler Anemometry System: With Measurements in Annular and Labyrinth Seals," May 1989, Mechanical Engineering Department, Texas A&M University.

Swan, David, "Flow Field Study of a Rectangular Jet," July 1990, Mechanical Engineering Department, Texas A&M University.

Nail, Greg, "3-D Laser Anemometer Study of Compressible Flow Through Orifice Plates," May 1991, Mechanical Engineering Department, Texas A&M University

Dwayne P. Terracina, "The Experimental and Numerical Development of a Slotted Orifice Meter and Its Design Parameters," Doctor of Philosophy Dissertation, Mechanical Engineering Department, Texas A&M University, December 1996

Charles A. Gaharan, "The Development of a Doppler Global Velocimeter and its Image Processing Schemes for Whole-Field Measurements of Velocity," Doctor of Philosophy Dissertation, Mechanical Engineering Department, Texas A&M University, December 1996

Bernard Robic, "An Experimental and Numerical Analysis of the Effects of Swirl on the Pressure Field in Whirling Annular and Labyrinth Seals", May 1999, Mechanical Engineering Department, Texas A&M University.

David Panak, "Experimental and Numerical Investigation of Turbulent Swirling Flow in an Orifice Meter", May 1999, Mechanical Engineering Department, Texas A&M University.

Jose Gilarranz (Co), "Development of High-power, Compact Synthetic Jet Actuators for Flow Separation Control", December 2001, Aerospace Engineering, Texas A&M University.

Stephen Danczyk, "Experimental and Computational Investigation of the Flow Field Inside an Axial Fan," December 2002, Mechanical Engineering Department, Texas A&M University.

Justo Hernandez Ruiz, "Low Differential Pressure and Multiphase Flow Measurements by Means of Differential Pressure Devices," August 2004, Interdisciplinary Engineering, Texas A&M University.

Adnan Al-Ghasem, "Windback Seal Design for Gas Compressors: A Numerical and Experimental Study," May 2007, Mechanical Engineering, Texas A&M University.

Chaehwan Lim, "Numerical and Experimental Study for Windback Seals," May 2009, Mechanical Engineering, Mechanical Engineering, Texas A&M University.

Park, Sang Hyun, "The Effects of the Back Clearance Size and the Balance Holes on the Back Clearance

Flow of the Centrifugal Pump with Semi-Open Impeller,” August 2008, Mechanical Engineering, Texas A&M University

Aarthi Sekaran, “Analysis of Flow Instabilities and Their Effect on Friction Factor in a Flat Plate Test Rig,” December 2012, Mechanical Engineering, Texas A&M University

Emanuel Ramsy Marsis, “CFD Simulation and Experimental Testing of Multiphase Flow Inside the MVP Electrical Submersible Pump,” December 2012, Mechanical Engineering, Texas A&M University.

Abhay Patil, “Performance Evaluation and CFD Simulation of Multiphase Twin-Screw Pumps, May, 2013, Mechanical Engineering, Texas A&M University.

Sahand Pirouspanah, “Experimental Measurement of Multiphase Flow and CFD Erosion Modeling in Electrical Submersible Pumps,” December 2014, Mechanical Engineering, Texas A&M University

Min-Hsiu “Scott” Chien, “Experimental and Computational Study Of Fluid Dynamics In Solar Reactor,” January 2014, Mechanical Engineering, Texas A&M University.

Sahand Pirouspanah, “Experimental Measurement of Multiphase Flow and CFD Erosion Modeling In Electrical Submersible Pumps,” August 2014, Mechanical Engineering, Texas A&M University

Sujan Reddy Gudigopuram, “Experimental and CFD Simulation of A Helico-Axial Pump,” August 2016, Mechanical Engineering, Texas A&M University

Peng Liu, “Performance Evaluation and Modeling of Twin Screw Pumps,” May 2016, Mechanical Engineering, Texas A&M University

Wenfei Zhang, “Experimental and CFD Simulation Of A Multiphase Canned Motor Pump,” December 2016, Mechanical Engineering, Texas A&M University

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Incomplete

Yi Chen
Changrui Bai
Yiming Chen
Yintau Wang

MASTER OF SCIENCE THESES, G.L. MORRISON COMMITTEE CHAIRMAN

Completed

Wattanachayakul, Montri, "Characterization of the Coherent Structure in a High Speed Subsonic Jet," August 1980, Mechanical Engineering Department, Texas A&M University.

Zeineddine, Talal, "Experimental Analysis of the Mechanics of Reverse Circulation Air Lift," August, 1980, Mechanical Engineering Department, Texas A&M University.

Ford, David (Co-Chairman), "An Investigation into the Feasibility of an External Combustion, Steam Injected Gas Turbine," May 1981, Mechanical Engineering Department, Texas A&M University.

Whitaker, Kevin, "Mach Number Dependence of the Coherent Structure in High Speed Subsonic Jets," May 1982, Mechanical Engineering Department, Texas A&M University.

Cogan, Kevin, "Leakage Prediction of Incompressible Fluids in Labyrinth Seals," December 1982, Mechanical Engineering Department, Texas A&M University.

Emami, Saied, "Phase Averaged Measurements of the Coherent Structure in a Mach Number 0.6 Jet," December 1983, Mechanical Engineering Department, Texas A&M University.

Chi, Daesung, "Leakage Estimation of Incompressible Fluids in Stepped Labyrinth Seals," December 1983, Mechanical Engineering Department, Texas A&M University.

Tonanont, Anake, "Reynolds Number Dependence of the Coherent Structure in an Axisymmetric Water Jet," May 1985, Mechanical Engineering Department, Texas A&M University.

Sheth, Ketan, "Effects of Friction Factor and Slip Factor on the Performance of a Centrifugal Slurry Pump," August 1985, Mechanical Engineering Department, Texas A&M University.

Roddy, Pat, "Characteristics of a Multiple Disk Pump with Turbulent Rotor Flow," December 1985, Mechanical Engineering Department, Texas A&M University.

Long, Michael, "A 3-D Laser Velocimeter Investigation of Turbulent Incompressible Flow in an Exisymmetric Sudden Expansion," July 1986, Mechanical Engineering Department, Texas A&M University.

Waughtal, Scott, "Leakage Estimation of Incompressible Fluids in Stepped Labyrinth Seals with Swirl," August 1986, Mechanical Engineering Department, Texas A&M University.

Wiedner, Brian, "Experimental Investigation of Velocity Biasing in Laser Doppler Anemometry," December 1988, Mechanical Engineering Department, Texas A&M University.

Panak, David, "3-D Laser Doppler Velocimetry Study of Incompressible Flow Through an Orifice Plate," May 1990, Mechanical Engineering Department, Texas A&M University

Thames, David, "Mean Flow and Turbulence Characteristics in Whirling Annular Seals," May 1992, Mechanical Engineering Department, Texas A&M University

Rashid, Kazi, "Laser Velocimetry Study of the Flow Field in a Centrifugal Pump," May 1993, Mechanical Engineering Department, Texas A&M University

Das, Purandar, "3-D Laser Doppler Velocimeter Measurements of Eccentric Annular and Labyrinth Seals, May 1993, Mechanical Engineering Department, Texas A&M University

Hess, John, "Dynamic Pressure Response of Water Flow Between Closely Spaced Roughened Flat Plates," May 1993, Mechanical Engineering Department, Texas A&M University

Nava, Deborah, "Observations of Friction Factors for Various Roughness Patterns in Channel Flow," May 1993, Mechanical Engineering Department, Texas A&M University

Pattabhi, Srikanth, "A Study of the Coherent Structures and Installation Effects in an Orifice Flow Meter," August 1993, Mechanical Engineering Department, Texas A&M University

Sarker, Arunava, "Effects of Geometric Scaling on Static Pressure Measurements in Orifice Flow-Meters," August 1993, Mechanical Engineering Department, Texas A&M University

Shresta, Sanjiv, "The Effects of Preswirl on Flow Through Centered and Eccentric Annular Seals," December 1993, Mechanical Engineering Department, Texas A&M University

Gaharan, Charles, "Development of a One-Component Doppler Global Velocimeter", December 1993, Mechanical Engineering Department, Texas A&M University

Macek, Michael, "A Slotted Orifice Plate Used as a Flow Measurement Device, December 1993, Mechanical Engineering Department, Texas A&M University

Moran, Michael, "Laser Velocimetry Study of the Flow Field in a Centrifugal Pump with a Shrouded Impeller," May 1994, Mechanical Engineering Department, Texas A&M University

Ihfe, Larry, "Development of Slotted Orifice Flow Conditioner," May 1994, Mechanical Engineering Department, Texas A&M University

Winslow, Robert, "Dynamic Pressure and Shear Stress Measurements on the Stator Wall of Whirling Annular Seals," December 1994, Mechanical Engineering Department, Texas A&M University

Jayden Hauglie, "A Study of Swirl and Axial Velocity Profile Effects on Orifice Flowmeters," December 1994, Mechanical Engineering Department, Texas A&M University

Bernard Robic, "A 3D Laser Doppler Velocimetry Study of the Upstream Velocity Profile Effects Upon the Flow Field Inside an Orifice Flowmeter," December 1995, Mechanical Engineering Department, Texas A&M University.

Kenneth C. Marsden, "Two-Phase Friction Pressure Drop Through Corrugated Tubes and Quick-Disconnect Attachments in Reduced Gravity," December 1996, Mechanical Engineering Department, Texas A&M University, (Co-Chair Fred Best)

Sohaib Anwer, "Pressure and Momentum Field Investigation of a Centrifugal Pump Through Dynamic Loading of a Semi-Open Impeller", August 1998, Mechanical Engineering Department, Texas A&M University.

Karine Tung, "Numerical and Experimental Study on the Effects of Elbows Upon the Flow Downstream", December 1998, Mechanical Engineering Department, Texas A&M University.

Carl Brewer, "Evaluation of the Slotted Orifice Plate as a Two-Phase Flow Meter," December 1999, Mechanical Engineering Department, Texas A&M University.

Anita Flores, "Evaluation of a Slotted Orifice Plate Flow Meter Using Horizontal Two Phase Flow", December 2000, Mechanical Engineering Department, Texas A&M University.

Syed Hossain, "Effect of Back Clearance and Balance Hole Upon Centrifugal Pump Performance", December 2000, Mechanical Engineering Department, Texas A&M University.

Tricia Sue Veeder, "Photomicrography for the Measurement of Steam Wetness Fraction in Low Pressure

Turbines,” December 2001, Mechanical Engineering, Texas A&M University

Aaron Barr, “Development of a Frequency Doubled High Powered Laser Diode End-Pumped Nd:YVO₄ /LBO Laser,” May 2003, Mechanical Engineering Department, Texas A&M University.

Arun Suryanarayanan, “Experimental Measurement and Analysis of Wall Pressure Distribution for a 50% Dynamically Eccentric Whirling Annular Seal,” May 2003, Mechanical Engineering Department, Texas A&M University.

Nader Berchane, “Experimental Evaluation of the Flow Inside an Open Faced Impeller,” December 2003, Mechanical Engineering Department, Texas A&M University.

Vasanth Muralidharan, “Response of a Slotted Plate Flow Meter to Horizontal Two-Phase Flow.”, December 2003, Mechanical Engineering Department, Texas A&M University.

Sang Hyun Park, “The Effects Between Two Slotted Plate Flow Meter Under Single, Two, Three Components Flow Condition,” August 2004, Mechanical Engineering Department, Texas A&M University

Sara Sparks, “Two Phase Mixing Comparison, Oil Contamination Comparison and Manufacturing Accuracy Effect on Calibration of Slotted Orifice Meter,” August 2004, Mechanical Engineering Department, Texas A&M University.

Pardeep Singh Brar, “CFD Evaluation of Pipeline Gas Stratification at Low Fluid Flow Due to Temperature Effects,” December 2004, Mechanical Engineering, Texas A&M University

Raman Chadha, “Design of High Efficiency Blowers for Future Aerosol Applications,” December 2005, Mechanical Engineering Department, Texas A&M University.

Domenic Cusano, “Experimental Measurement of Phase Averaged Wall Pressure Distributions for a 25% Eccentric Whirling Annular Seal,” May 2006, Mechanical Engineering Department, Texas A&M University.

Brent Nelson, “The Development of a Frequency Control System of a Seeded Laser for DGV Application,” December 2008, Mechanical Engineering, Texas A&M University

Saikishan Suryanarayana, “Labyrinth Seal Leakage Equation,” May 2009, Mechanical Engineering, Texas A&M University

Aarthi Sekaran, “Study of Impact of Orbit Path, Whirl Ratio, and Clearance on the Flow Field and Rotordynamic Coefficients for a Smooth Annular Seal,” August 2009, Mechanical Engineering, Texas A&M University

Sravani Mukkisa, “Comparison of Effects of High Pressure Compressible Gas on Carry Over Coefficient and Discharge Coefficient of the Labyrinth Seal,” December 2009, Mechanical Engineering, Texas A&M University

Enas Jeelani Aziz, “Effect of Large Clearance to Pitch Ratios on Labyrinth Seal Leakage,” December 2009, Mechanical Engineering, Texas A&M University

Anand Vijaykumar, “Numerical Simulation of the Flow Field in 3D Eccentric Annular and 2D Centered Labyrinth Seals for Comparison With Experimental Data,” December 2010, Mechanical Engineering,

Texas A&M University

Milind Khandare, "Numerical Simulation of Flow Field Inside a Squeeze Film Damper and the Study of the Effect of Cavitation on the Pressure Distribution," December 2010, Mechanical Engineering, Texas A&M University

Sunil Panicker, "Leakage Prediction of Labyrinth Seals Having Advanced Cavity Shapes," December 2010, Mechanical Engineering, Texas A&M University

Terdsak Neadkratoke, "Numerical Investigation of Flow Fields and Forces for 2-D Squeeze Film Dampers," May 2011, Mechanical Engineering, Texas A&M University

Ryan Kroupa, "Investigation of a Multiphase Twin-Screw Pump Operating at High Gas Volume Fractions," May 2011, Mechanical Engineering, Texas A&M University

Michael Glier, "An Experimental Examination of a Progressing Cavity Pump Operating at Very High Gas Volume Fractions," May 2011, Mechanical Engineering Department, Texas A&M University.

Hossain Ahmed Tanvir, "Evaluation of Stream Turbine Triangular Tooth on Stator Labyrinth Seal," May 2012, Mechanical Engineering Department, Texas A&M University.

Praneetha Boppa, "Numerical Simulation of Squeeze Film Dampers and Study of the Effect of Central Groove on the Dynamic Pressure Distribution," August 2011, Mechanical Engineering Department, Texas A&M University.

Shanker Narayanan, "Fluid Dynamic and Performance Behavior of Multiphase Progressive Cavity Pumps," August 2011, Mechanical Engineering Department, Texas A&M University.

Jeng Won Woo, "Analysis of Compressible and Incompressible Flows Through See-Through Labyrinth Seals," May 2011, Mechanical Engineering Department, Texas A&M University.

Garaav Chaudhary, "Labyrinth Seal Leakage Analysis," August 2011, Mechanical Engineering Department, Texas A&M University.

Ekene Obidigbo, "The Effect of High Rotational Speed on the Performance of Straight-Through Labyrinth Seals for Compressible and Incompressible Flow," May 2012, Mechanical Engineering Department, Texas A&M University.

Orcun Inam, "Labyrinth Seal Leakage Analysis," August 2011, Mechanical Engineering Department, Texas A&M University.

Vamshi Yamsani, "Numerical Study of Geometry and Rotation Dependence on the Flow in Labyrinth Seals," August 2011, Mechanical Engineering Department, Texas A&M University.

Daniel Cihak, "Separator Design For Use In High GVF Multiphase Flow," August 2012, Mechanical Engineering Department, Texas A&M University.

Klayton Kirkland, "Design and Fabrication of a Vertical Pump Multiphase Flow Loop," December 2012, Mechanical Engineering Department, Texas A&M University.

Nicolas Carvajal-Diaz, "Effects of Sand on the Components and Performance of Electric Submersible

Pumps,” December 2012, Mechanical Engineering Department, Texas A&M University.

Hossain Tanvir, “Evaluation of Steam Turbine Triangular Tooth on Stator labyrinth Seal, May 2012, Mechanical Engineering Department, Texas A&M University.

Serafettin Ustun, “Comparison of the Leakage Characteristics of the Straight Annular and Convergent Seals, August 2012, Mechanical Engineering Department, Texas A&M University.

Muhammet Cevik, “Evaluation of a Close Coupled Slotted Orifice, Electrical Impedance, and Swirl Flow Meter for Multiphase Flow,” August 2013, Mechanical Engineering Department, Texas A&M University.

20 Theodore Hatch, “Design and Construction of a High Pressure System for Evaluating Multiphase Twin-Screw Pumps,” December 2013, Mechanical Engineering Department, Texas A&M University.

Joseph Marchetti, “Design, Construction, and Visualization of Transparent Full Scale High Pressure Test Facility for Electric Submersible Pumps.” December 2013, Mechanical Engineering Department, Texas A&M University.

Ramy Saleh, “Experimental Testing of an Electrical Submersible pump Undergoing Abrasive Slurry Erosion,” May 2013, Mechanical Engineering Department, Texas A&M University.

Dezhi Zheng, “Three Phase Erosion Testing and Vibration Analysis of an Electrical Submersible Pump,” December 2013, Mechanical Engineering Department, Texas A&M University.

Daniel Steck, “Experimental Study of Multiphase Pump Wear,” August 2014, Mechanical Engineering, Texas A&M University

Mustafa Karabacak, “The Development of an Accuracy of a Doppler Global System For One Dimensional Velocity Measurement,” August 2014, Mechanical Engineering, Texas A&M University

Burak Erdogan, “Watercut Measurement Method by Using High Speed Impedance Sensor,” December 2014, Mechanical Engineering, Texas A&M University

Turhan Yusuf, “Efficiency and Leakage Analysis Of A Twin-Screw Multiphase Pump,” May 2014, Mechanical Engineering, Texas A&M University

Yong Zheng, “The Development of a Doppler Global Velocimeter For Whole-Field Velocity Measurement and Its Image Processing Schemes Using Single Camera,” May 2015, Mechanical Engineering, Texas A&M University

Gautham Annamalai, “Characterization of Flow Homogeneity Downstream of a Slotted Orifice Plate in a Two-Phase Flow Using Electrical Resistance Tomography,” May 2015, Mechanical Engineering, Texas A&M University

Andrew William Johnson, “Development and Validation of an Electrical Submersible Pump Bearing Erosion Facility That Replicates the Conditions Experienced During Pump Operation,” December 2015, Mechanical Engineering, Texas A&M University

Dohar Jono Sihombing, “Temperature Effect in Multiphase Flow Meter Using Slotted Orifice Plate,” May 2015, Mechanical Engineering, Texas A&M University

Craig Randall Nolen, "Design, Construction, and Evaluation of Low-Cost Electrical Impedance Based Multiphase Flow Meter with Two Phase Flow in Large Diameter Pipes," July 2015, Mechanical Engineering, Texas A&M University

Ke Li, "Effectiveness Analysis of Slotted Orifice Plate Multiphase Flow Meter Coupled With Venturi Meter And Visualization Study," December 2016, Mechanical Engineering, Texas A&M University

Wenjie Yin, "CFD Simulation Of The Influence Of Viscosity On An Electrical Submersible Pump," August 2016, Mechanical Engineering, Texas A&M University

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Incomplete

Rahul Agarwal

SENIOR THESES, G.L. MORRISON ADVISOR

Hess, John, "Flat Plate Tester," May 1991, Mechanical Engineering Department, Texas A&M University

Beam, Eric, "The Effects of the Upstream Velocity Profile on the Accuracy of Orifice Meters, May 1992, Mechanical Engineering Department, Texas A&M University

Thomas, Jason, "Determination of Variation of Friction Factor with Reynolds Number for Flow Between Two Closely Spaced Rough Flat Plates," May 1992, Mechanical Engineering Department, Texas A&M University

Nunes, Sudhir, "A Comparison of Pressure Measurement Systems for an Annular Seal with Whirl," December 1993, Mechanical Engineering Department, Texas A&M University

