

**SHORT COURSE T2/P2**  
**THE UTILIZATION OF COMPUTATIONAL FLUID DYNAMICS IN TURBOMACHINERY**  
**DESIGN AND ANALYSIS**

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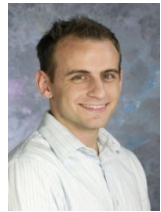
**Edward M. Bennett, Ph.D.** - As MSI's Director of Fluids Engineering, Dr. Bennett is experienced in new product development, and has been deeply involved in many major rotating machinery programs. His design methodology is used by companies around the world, and he lectures widely on these subjects. He graduated from the Naval Academy, and holds a Ph.D. in Fluid Mechanics from Johns Hopkins University. In 2009, Dr. Bennett received ASME's prestigious Gopalakrishnan Award for Fluids Engineering. He is currently the Associate Technical Editor for the Journal of Fluids Engineering (ASME).

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**Travis A. Jonas** joined MSI as a Senior Staff Engineer in 2011. Mr. Jonas received NASA's Space Flight Awareness (SFA) Award in 2000 for his contribution in the development of the Space Shuttle's High Pressure Fuel Turbopump/Alternate Turbopump (HPFTP/AT). The SFA is considered one of the highest awards presented to NASA and/or significant industry partners related to the human space flight program. At MSI, Mr. Jonas performs project management, as well as finite element analysis (FEA) and Computational Fluid Dynamics (CFD) analysis of complex flowpaths within turbomachinery. Mr. Jonas received his Bachelors Degree in Mechanical engineering from Purdue University.

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**Grant O. Musgrove** is currently an Engineer in the Machinery Structural Dynamics Section within the Fluids and Machinery Department at Southwest Research Institute. He earned his Bachelor and Master degrees in Mechanical Engineering from Oklahoma State University in 2007 and The Pennsylvania State University in 2009, respectively. Mr. Musgrove's research interests are in the areas of fluid dynamics, heat transfer, thermodynamics, and structural dynamics in rotating machinery applications.

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**Andrew H. Lerche** is a Senior Research Engineer at Southwest Research Institute in San Antonio, TX. He holds B.S. and M.S. in Mechanical Engineering from the University of Texas at Austin and the University of Texas at San Antonio, respectively. Over the last 10 years he has worked in areas involving mechanical design, rotordynamic analysis, finite element analysis, computational fluid dynamics, experimental testing, and test rig development. His interests include structural dynamics, modal testing and analysis, fluid-structure interaction, rotordynamics, instrumentation and telemetry, and sustainable/renewable energies.

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**Vishwas Iyengar, Ph.D.** is currently working as a Senior Technical Specialist at Prospect Flow Solutions in Houston, Texas. Prior to that Dr Iyengar worked in the Machinery Program at Southwest Research Institute for 4.5 years. Dr Iyengar received his Ph.D. in Aerospace Engineering from Georgia Institute of Technology in 2007. His research interests include Root Cause Failure Analysis, Computational Fluid Dynamics and Renewable Energy. Dr Iyengar has authored 4 Journal Publications, 18 Peer Reviewed Conference Papers and presented numerous Turbomachinery related tutorials/lectures.

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**James Hardin** is a Senior Engineer in the Advanced Technology department at Elliott Company, in Jeannette, Pennsylvania, where he performs computational fluid dynamics (CFD) and other aerodynamic analyses for turbines and compressors. Previous experience includes CFD and other analyses on shipboard propulsion and piping systems with Westinghouse Electric Corporation, and turbine design support and testing at Elliott Company. He has 31 years of engineering experience, mostly in aerodynamics and fluid systems. Mr. Hardin received a B.S. degree (Mechanical Engineering, 1981) from Carnegie-Mellon University, and is a registered Professional Engineer in the State of Pennsylvania.