

The Wonders of Multiphase Flows: PIV Measurements

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Abstract. Non-invasive methods for flow velocity measurements have been continuously increasing in popularity and prevalence across many areas of experimental single and multiphase flows and with applications that range from academic research and industrial application. A series of experimental work to achieve high-fidelity optical measurements of single and multiphase bubbly flows are performed. Experimental methods of high-speed photography, infrared (IR) thermometry and PIV are employed to achieve measurement over multiple scales. The presentation includes the measurement issues via optical visualization of fundamental bubble parameters such as departure diameter and frequency during nucleation, experimental methodology to achieve accurate velocity and temperature measurement, specifically near wall measurements are addressed. Paramount importance is rigorously quantifying the uncertainty of the measurements. The presentation will cover examples of the results in several practical applications as in nuclear reactor components, DNA replication and biohazards. The whole-field velocity data are used for validation of computational fluid dynamic computer programs and development of mechanistic models in complex geometries.

Biography. Dr. Yassin Hassan is Head of the Department of Nuclear Engineering, Sallie and Don Davis '61 Professor of Engineering and Professor of the Department of Mechanical Engineering at Texas A&M University. Prior to joining Texas A&M in September 1986, he worked for seven years at Nuclear Power Division, Babcock & Wilcox Company, Lynchburg, Virginia. His research is in computational and experimental thermal hydraulics, reactor safety, laser-based flow visualization and diagnostic imaging techniques, system modeling, multiphase flow, transient and accident analyses and advanced nuclear reactors. He received his master's and Ph.D. degrees from the University of Illinois at Urbana-Champaign in nuclear engineering. He also has a master's degree in mechanical engineering from the University of Virginia.



Dr. Hassan's professional recognitions include selection as a fellow of the American Association for the Advancement of Science (AAAS), the American Nuclear Society (ANS), and the American Society of Mechanical Engineers (ASME). He was awarded the 2008 ANS Seaborg Medal for outstanding research contributions, the 2003 George Westinghouse Gold Medal for achievements in power field of mechanical engineering, the 2004 Thermal Hydraulics Technical Achievement Award by the Thermal Hydraulic Division of the ANS, the 2003 ANS Arthur Holly Compton Award for contributions to nuclear engineering education and research, and the 2001 Glenn Murphy Award of the American Association for Engineering Education.

He is the editor-in-chief of Nuclear Engineering and Design, the premier technical journal of the nuclear engineering field. Dr. Hassan was sworn in as a part-time technical judge to the Atomic Safety and Licensing Board Panel of the U.S. Nuclear Regulatory Commission.