

**Zuhair M. Ibrahim, Ph.D., P.E.**  
**Senior Engineer**

**Professional Profile**

Dr. Zuhair M. Ibrahim is a Senior Engineer in Exponent's Thermal Sciences practice. Dr. Ibrahim applies mechanical engineering, thermodynamic, and fluid dynamic principles to the study of processes in turbomachinery, fires, explosions, and a variety of other combustion devices. Dr. Ibrahim is especially interested in investigation and analysis of problems related to turbo machinery and combustion. He has analytic and experimental experience with the analysis of thermo-acoustic instabilities in gas turbines.

Prior to joining Exponent, Dr. Ibrahim worked as a combustion consultant at Solar Turbines Incorporated. His research involved developing tools to predict and mitigate the impact of combustion-driven acoustic instabilities on gas turbines used for power generation. He has also worked as a research engineer at United Technologies Research Center (Pratt and Whitney R&D group), where he carried out numerous studies related to the investigation, optimization, and enhancement of turbine, afterburner, and rocket performance.

Dr. Ibrahim also served as a country consultant with the United Nations Development Programme in East Africa where he helped oversee the implementation of several infrastructure projects.

**Academic Credentials and Professional Honors**

Ph.D., Aerospace Engineering, University of California, San Diego, 2007  
M.Sc., Management, Rensselaer Polytechnic Institute, 2002  
M. Eng., Aerospace Engineering, University of Alabama, Huntsville, 2000

United Technologies Research Center's Outstanding Technical Achievement Award, June 2003;  
AIAA award for 2<sup>nd</sup> Place Technical Paper in South-Eastern Student Conference, April 2000

**Licenses and Registrations**

Registered Professional Mechanical Engineer, California, #M034508

Traffic Accident Investigation I, Northwestern University, 2008  
Gas Turbine Accident Investigation, University of Southern California, 2007  
Centrifugal Compressor Design and Performance, Concepts NREC, 2002  
Master Scuba Diver, Professional Association of Diving Instructors, 2001

## **Languages**

Arabic

## **Publications**

Ibrahim ZM, Williams FA, Buckley SG, Twardochleb CZ. An acoustic-energy method for estimating the onset of acoustic instabilities in premixed gas-turbine combustors. *J Eng Gas Turbine Power* 2008; 130, September.

Ibrahim ZM. An acoustic energy framework for predicting combustion-driven acoustic instabilities in premixed gas-turbines. Ph.D. dissertation, University of California, San Diego, CA, 2007.

## **Presentations and Published Abstracts**

Ibrahim ZM, Williams FA, Buckley SG, Twardochleb CZ. A method for estimating the onset of acoustic instabilities in premixed gas-turbine combustors. ASME Turbo Expo, Montreal, Canada, 2007.

Ibrahim ZM, Williams FA, Buckley SG. A study of combustion-driven acoustic instabilities in premixed gas-turbines using an acoustic energy framework. 5<sup>th</sup> Combustion Institute Meeting, San Diego, CA, March 2007.

Gharavi M, Ibrahim ZM, Borchert M, Williams FA, Buckley SG, Arellano LO. Turable diode laser measurements of equivalence-ratio fluctuations for premixed gas-turbine applications. 5<sup>th</sup> Combustion Institute Meeting, San Diego, CA, March 2007.

Ibrahim ZM, Williams FA, Buckley SG, Lee JCY. An acoustic energy approach to modeling combustion oscillations. ASME Turbo-Expo, Barcelona, Spain, May 2006.

Ibrahim ZM, Landrum DB. CFD modeling of regenerative cooling in a 15 K Fastrac rocket engine. AIAA Southeast Region Student Conference, Savannah, GA, April 2000.

## **Technical Reports**

Tillman TG, Lin R, Ibrahim ZM, Bertuccioli L. Flow control for aggressive turbine transition ducts and high-lift airfoils. Prepared for NASA Glenn Research Center under UEET tasks 17 and 19, UTRC, 2001.

Landrum DB, Ibrahim ZM. CFD analysis of a regeneratively cooled Fastrac thrust chamber. Prepared for Space America Inc., University of Alabama, Propulsion Research Center, 2000.

## **Prior Experience**

Engineering Consultant, Solar Turbines Inc., 2005–2007  
Research Engineer, United Technologies Research Center, 2000–2003  
Country Consultant, United Nations Development Programme, 2002–2003

## **Peer Reviewer**

- *Journal of Engineering for Gas Turbine and Power*

## **Professional Affiliations**

- American Institute for Aeronautics and Astronautics—AIAA
- American Society for Mechanical Engineers—ASME
- National Fire Protection Association—NFPA
  - Principal Member: Technical Committee on Internal Combustion Engines and Gas Turbines. The committee is responsible for NFPA 37 Standard.
- The Combustion Institute
- Institute of Mechanical Engineers—IMECHE