

**Abid Kemal, Ph.D.**  
**Principal**

**Professional Profile**

Dr. Abid Kemal is a Principal in Exponent's Thermal Sciences practice. His responsibilities include the analysis and investigation of fires, explosions, and detonations. He carries out work related to combustion, thermodynamics, gas dynamics, macro- and micro-scale heat transfer, feedback control of complex dynamic plants and micromachining. Dr. Kemal studies air-breathing propulsion systems and stationary gas turbines and has experience in applying advanced control techniques to optimize the performance of such plants. He has designed and built a CMOS-compatible micromachined sensor for the measurement of pollutant emissions in combustion exhausts. Dr. Kemal also maintains an interest in international environmental law and policy and has recently authored the first ever fire laws for the government of Pakistan.

Prior to joining Exponent, Dr. Kemal was a Research Assistant in the High Temperature Gas Dynamics Laboratory at Stanford University. As part of his graduate work, he taught numerous classes on thermodynamics, gas dynamics, and combustion, at both graduate and undergraduate levels. He performed independent peer reviews of research proposals and of publications in the Combustion Institute's journal *Combustion and Flame*. He also worked as an independent consultant for Alzeta Corporation and for NASA Ames. Before joining Stanford, he worked in Pakistan as a Programmer and Operator of CNC machines (Spinning Machinery Company, Lahore); as a Management Trainee (ICI Soda Ash Plant, Khewra); and as a Production Engineer (Career Telephone Industries, Islamabad, a subsidiary of Siemens AG).

**Academic Credentials and Professional Honors**

Ph.D., Mechanical Engineering, Stanford University, 1999  
M.S., Mechanical Engineering, Stanford University, 1994  
B.Sc., Mechanical Engineering, Engineering University, Peshawar, (with honors), 1989

The Centennial Teaching Award, Stanford University (1995–1996); Government of Pakistan's Scholarship for Doctoral Studies Abroad (1992–1994); President of Pakistan's Award for Academic Excellence (1989); Valedictorian and Gold Medal Recipient, Engineering University, Peshawar (1989); University Divisional Scholarship (1984–1989)

**Licenses and Certifications**

40-Hour OSHA HAZWOPER Certification No. 18178, Hazardous Waste Operations and Emergency Response Certification per 29CFR1910.120 and Cal-OSHA GISO 5192

Fire Investigation: Origin and Cause Determination (1A), State of California, Office of the State Fire Marshall

Fire Investigation: Techniques of Fire Investigation (1B), State of California, Office of the State Fire Marshall

## **Languages**

Urdu, Hindku, Punjabi

## **Publications**

Barrera C, Hosseini K, Kemal A. Transient reservoir conditions and leak flow rate for a choked orifice: Basic Principles, Estimation and Applications. Proceedings, 7<sup>th</sup> Global Congress on Process Safety, Chicago, IL, March 13–16, 2011. American Institute of Chemical Engineers ISBN 978-0-8169-1067-10.

Barrera C, Kemal A. Condensation induced water hammer: Principles and consequences. Proceedings, 6<sup>th</sup> Global Congress on Process Safety, San Antonio, TX March 21–25, 2010. American Institute of Chemical Engineers ISBN 978-0-8169-1064-9.

Kemal A, Mattison D, Murray S, Loose M. Degradation and ignition of polyvinyl chloride wire insulation. Proceeding, Fire and Materials, San Francisco, CA, 2007.

McGoran B, Ross B, Nunes S, Buehler C, Reza A, Kemal A, Fessler, J, Belanger J, Arnold D. Evaluation of a chemical plant explosion and lessons learned. Proceedings, Safety and Reliability, Annual Meeting of the Chinese Mechanical Engineering Society and 1<sup>st</sup> Annual Meeting of the Chinese Academy of Engineering, Mechanics and Transportation Engineering Division, pp. 252–257, 2006.

Reza A, Kemal A, Markey E. Runaway reactions in the aluminum, aluminum chloride, HCl and steam system: An Investigation of the 1998 Condea Vista Explosion in Baltimore, Maryland. AIChE Loss Prevention Symposium, New Orleans, LA, November 2001.

Kemal A. Adaptive control and its applications to combustion systems. 26<sup>th</sup> International Nathiagali Summer College, Nathiagali, 2001.

Kemal A. Active real-time control of air-breathing combustors. Ph.D. Thesis, Stanford University, July 1998.

Kemal A, Bowman CT. Real-time adaptive feedback control of combustion instability. 26<sup>th</sup> Symposium International on Combustion, The Combustion Institute, Pittsburgh, PA, August 1996.

Kemal A, Pinnillia M. Feedback control of an adaptive treadmill. Consulting Report for NASA Ames, Mountain View, CA, August 1997.

## **Presentations**

Kemal A, Mattision D, Murray S, Loose M. Degradation and ignition of polyvinyl chloride wire insulation. Proceedings, Fire and Materials 2007, San Francisco, CA, 2007.

Kemal A. Fire and explosions—Analysis and investigative techniques. Invited Lecture, Department of Aeronautics and Astronautics, Stanford University, April 2005, April 2006, and April 2007.

Kemal A, MacDonald M, Hebert J, Kytömaa HK. Explosion hazards due to delayed ignition in gas turbines. Electric Power Conference, Baltimore, MD, March 2004.

Kemal A, Dorn J, Bowman CT. Control of nitrogen oxide emissions from air-breathing combustors using partial premixing of fuel and air. The Combustion Institute, Western States Section, Fall Meeting, Diamond Bar, CA, October 1997.

Kemal A, Bowman CT. Active adaptive control of combustion. The Combustion Institute, Joint Technical Meeting, San Antonio, TX, September 1995.

Kemal A, Bowman CT. Active adaptive control of combustion. 4<sup>th</sup> IEEE Conference on Control Applications, Albany, NY, April 1995.

## **Prior Experience**

Independent Thermosciences Consultant, 1999–2002

Research Assistant, High Temperature Gas Dynamics Laboratory, Stanford University, 1993–1998

Teaching Assistant, Thermosciences Division, Stanford University, 1996–1998

Production Engineer, Career Telephone Industries, Islamabad, Pakistan (subsidiary of Siemens, AG), 1989–1991

Management Trainee, ICI Soda Ash Plant, Khewra, Pakistan, 1990

Programmer and Operator of CNC machines, Spinning Machinery Company, Lahore, Pakistan, 1988

## **Current Academic Appointments**

- Guest Lecturer, Stanford University, School of Engineering
- Instructor, Alameda County DA's Arson Task Force

## **Peer Reviewer**

- Combustion and Flame, IEEE Transactions on Components and Packaging

## **Professional Affiliations**

- The Combustion Institute (member)
- American Society of Mechanical Engineers (member)
- Pakistan Engineering Council (member)
- National Fire Protection Association (member)