Abstract
Unsteady flow oscillations, commonly known as combustion instabilities, were discovered in rocket and air-breathing engines in the late 1930s. Since then, combustion instabilities have plagued most, or in fact practically all, engine development programs. Indeed, because of the high density of energy release in a volume having relatively low losses, conditions favor excitation and sustenance of flow oscillations in any combustion chamber intended for use in a propulsion system.

This seminar will provide an overview of combustion instabilities in four different types of propulsion systems (solid rocket, liquid rocket, gas turbine, and ramjet/scramjet engines). Emphasis will be placed on the present understanding of the processes involved, and contemporary research needs and challenges. Various research issues in acoustics, fluid mechanics, and chemistry related to oscillatory combustion in practical systems will be discussed. Both passive and active control techniques will be covered. Applications of contemporary numerical schemes, approximate analytical methods, and experimental diagnostic tools to combustion instability studies will be addressed.

Bio
Vigor Yang is the William R. T. Oakes Professor and Chair of the School of Aerospace Engineering at the Georgia Institute of Technology. He has published 10 comprehensive volumes and numerous technical papers on aerospace propulsion and energetics. He has received several publication and technical awards from the American Institute of Aeronautics and Astronautics (AIAA) and American Society of Mechanical Engineers (ASME), including the Air-Breathing Propulsion Award (2005), the Pendray Aerospace Literature Award (2008), the Propellants and Combustion Award (2009), the Worcester Reed Warner Medal (2014), and JANNAF Interagency Propulsion Lifetime Achievement Award (2014). Dr. Yang was the editor-in-chief of the AIAA Journal of Propulsion and Power (2001-2009) and the JANNAF Journal of Propulsion and Energetics (2009-2012). He is currently an editor of the Aerospace Book Series of the Cambridge University Press (2010-). A member of the U.S. National Academy of Engineering, Dr. Yang is a fellow of the AIAA, ASME, and Royal Aeronautic Society (RAeS).