

COMBUSTION WEBINAR

Complex system approach to investigate and mitigate thermoacoustic instability in turbulent combustors

Speaker: R.I. Sujith, IIT Madras, India

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Abstract: Thermoacoustic instability in turbulent combustors is a nonlinear phenomenon resulting from the interaction between acoustics, hydrodynamics, and the unsteady flame. Over the years, there have been many attempts toward understanding, prognosis, and mitigation of thermoacoustic instabilities. Traditionally, a linear framework has been used to study thermoacoustic instability. In recent times, researchers have been focusing on the nonlinear dynamics related to the onset of thermoacoustic instability. In this context, the thermoacoustic system in a turbulent combustor is viewed as a complex system, and the dynamics exhibited by the system is perceived as emergent behaviors of this complex system. In this webinar, we discuss these recent developments and their contributions toward the understanding of this complex phenomenon. Furthermore, we discuss various prognosis and mitigation strategies for thermoacoustic instability based on complex system theory.

Biography: Dr. R. I. Sujith graduated with his B. Tech in Aerospace Engineering from the Indian Institute of Technology Madras in 1988 with first rank. He received his M. S. (1990) and Ph. D. (1994) from the Georgia Institute of Technology, where he received the “top graduate student in the college of engineering” award. He worked as a post-doctoral fellow at the Georgia Institute of Technology in 1995. He joined the Department of Aerospace Engineering at the Indian Institute of Technology Madras in 1995 and is currently the D. Srinivasan Chair Professor. He is a recipient of the Alexander von Humboldt Fellowship and the Hans Fischer Senior Fellowship of the Institute for Advanced Study (IAS) of the Technical University of Munich. Sujith was the founding Editor-in-Chief of the *International Journal of Spray and Combustion Dynamics* from 2009-2015, and is currently a member of the editorial advisory board of *Chaos*. He has won the Young Engineer Award of the Indian National Academy of Engineering. He has been awarded the Swarnajayanti Fellowship and the J. C. Bose Fellowship by the Department of Science & Technology. He is a fellow of the Indian National Academy of Engineering and the Indian Academy of Sciences, and has been conferred the title of “TUM ambassador” of the Technical University of Munich. Sujith currently works on the application of dynamical systems and complex systems theory to study and mitigate thermoacoustic instability.

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