Turbine-Burner Jet-Engine Innovation

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Friday, October 7, 2022 – 10:30 am
McDonnell Douglas Engineering Auditorium (MDEA)

Abstract: Specific Thrust and efficiency of a jet engine (specific power and efficiency in the case of power generation) are two opposing performance measures. We proposed the use of turbine-burner engines, in which, heat is added either continuously in the turbine (Continuous Turbine-Burner, ie., CTB) or discretely in the turbine stages (Inter-Stage Turbine Burner, ie., ITB) to resolve this conflict. Analyses will be presented to demonstrate the tremendous potential of the turbine-burner engine for increased specific thrust (power) and efficiency at the same time. The parameter regime where such advantages can be best achieved and some associated challenges and research opportunities will be identified. If time allows, I will also highlight a few of our accomplishments in Computational Fluid Dynamics for turbomachinery and propulsion.

Bio: Professor of Mechanical and Aerospace Engineering at the University of California, Irvine. He received his B.S. from Northwestern Polytechnic University in Xi’an, China; M.S. from Beijing University of Aeronautics and Astronautics; and Ph.D. from Princeton University. He joined UCI as an assistant Professor in Fall of 1991. He was the recipient of the Outstanding Engineering Professor Award from the students of Class 2000 at UC Irvine. His research interests include computational fluid dynamics, transonic, reactive, and two-phase flows, turbomachinery aerodynamics, aeroelasticity, and gas-turbine engine cycle innovation. He is the author or co-author of more than 100 journal articles. Dr. Liu is a Fellow of AIAA and ASME. He served as the Associate Editor for Journal of Fluids Engineering, International Journal of Computational Fluid Dynamics, and Journal of Propulsion and Power (continuing).