

**MECHANICAL AND AEROSPACE ENGINEERING SEMINAR
UNIVERSITY OF VIRGINIA, CHARLOTTESVILLE, VA**

Hypersonic turbulence: Interaction between aerodynamics and thermodynamics

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Where: Mechanical Engineering Building, MEC 339

When: Friday April 27, 2007, 10:00 AM

Refreshments at 9:30 AM, MAE Faculty Lounge, MEC 305

ABSTRACT:

I will begin with a very short discussion of all the research activities in my group. Then I will present the challenges of hypersonic turbulence and how it is different from 'regular' turbulence. This will be followed by a somewhat more detailed description of the hypersonic effects on various processes -- linear, inviscid non-linear and viscous -- that make up turbulence. The focus is on the interaction between flow and thermodynamic fluctuations and how the latter affects the former. Compressible version of rapid distortion theory (RDT) is developed to examine the linear interactions between velocity and temperature fluctuations. Turbulence cascade and small-scale structure are studied using the homogenized Euler equation (HEE) developed in our group. The dissipative processes are investigated using direct numerical simulations (DNS). Then, I present a short discussion of how turbulence can be described using the Boltzmann equation. I will conclude by presenting a complete qualitative picture of turbulence at high Mach numbers.

BIO:

- 1) Bachelor of Technology, from Indian Institute of Technology, Madras.
- 2) M.S. from Cornell : Thesis Supervisor – John L. Lumley
- 3) Ph.D. from Cornell: Thesis Supervisor – Steve Pope
- 4) From 1990 – 1992: NASA Langley contractor working of NASP RAMJET and SCRAMJET mixing and reaction problems
- 5) 1992 -1999 : At ICASE working on turbulence and combustion modeling
- 6) 1999 – Current at Texas A&M Aerospace Engineering Department