



FLAME AND COMBUSTION DYNAMICS LAB @ IIT KANPUR

Established in Collaboration with BARC



The Flame and Combustion Dynamics Lab was established in 2011 at Indian Institute of Technology Kanpur under an MOU signed between IIT Kanpur and Bhabha Atomic Research Centre, Department of Atomic Energy, Government of India in 2009 for the Development of Test Facility for the Study of Fire Propagation and Associated Thermal Hydraulic Aspects in Multiple Compartments.

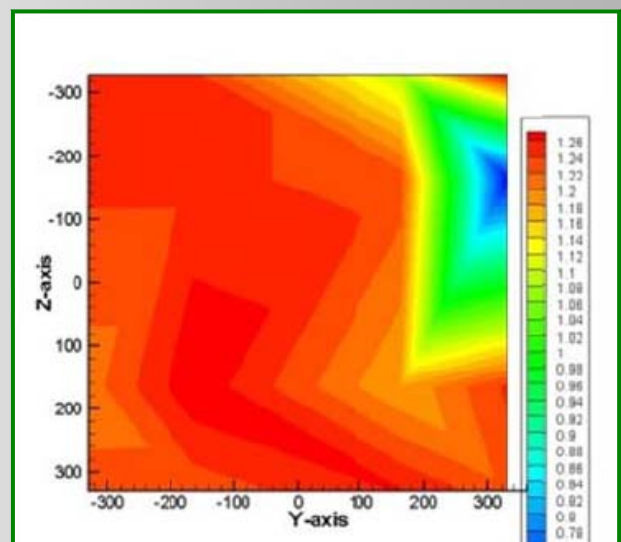
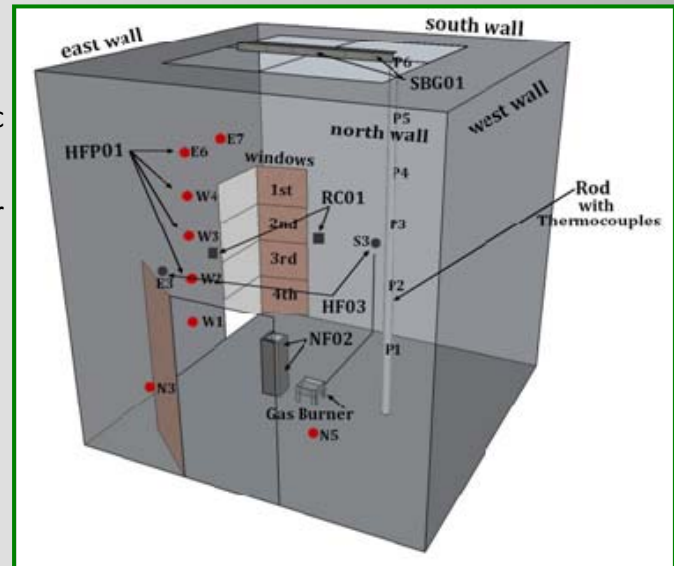
Objectives:

- Generate the inputs data for deterministic fire modeling
- Database for validation of CFD code for fire modeling
- Fire Suppression studies
- Combustion: Stability and Dynamics
- Spray formation and Dynamics
- Spray Combustion

Instrumentation and Infrastructure:

Data acquisition for most of the measurements is carried out using state of the art PXI based data acquisition system from NI. The major instruments available in this lab are:

- Spectrometer and Chemiluminescence's setup for heat release measurement
- Temperature compensated 5-hole and 7-hole Pitot probes (Aeroprobe Corp.)
- Compressed Air Supply ((20 bar, 1100 cfm), (30 bar, 100 cfm))
- PDPA/ 3D LDV system (with 5W Ar-ion laser)
- PIV, PLIF, LII
- Emission Analyzers (CO, CO₂, Nox, UHC, O₂)
- Multi-channel hotwire anemometry system
- Laser visualization and shadowgraph system
- High speed camera
- High resolution CCD cameras
- Coreolis flow meter, Mass flow-controllers
- IR camera, ICCD camera
- 200 KW online air heater
- Assorted Heat Flux Sensors



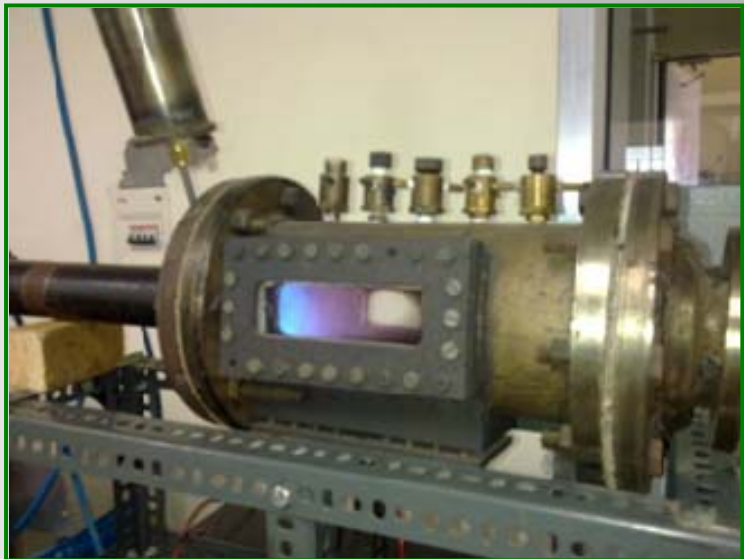
Velocity field at ceiling opening

Apart for the fire related research stated above, the lab is also involved in fundamental combustion research. Some of the test rigs are shown below:

Atmospheric Gas Turbine Combustor rig with optical access



High pressure Spray Chamber



Dump Combustor (Swirl Stabilized)

Major sponsors for this lab are: BARC/DAE, DST, DRDO, Pratt and Whitney.

Current Major Activities:

Multi-compartment Fire Hydraulic Studies (BARC)

Application of Biofuel for Aviation (DST-PWC)

Active and Passive Control of Combustor Hooting (Pratt and Whitney, Canada)

Liquid Jet Breakup in Swirling Cross Flow (Pratt and Whitney, USA)

Contact

Dr. A. Kushari

Department of Aerospace Engineering

Indian Institute of Technology Kanpur

Kanpur -208016, UP, India

Phone: +91-512-2597126

Email: akushari@iitk.ac.in

Web: <http://www.iitk.ac.in/aero/faculty/akushari>