IIM KALPAKKAM CHAPTER
Metallurgy Materials Engineering

Technical Lecture

Topic: **Challenges in Experimental and Numerical Impact Mechanics Research**

Speaker: **Dr. Syed Nizamuddin Khaderi, Associate Professor, Department of Mechanical and Aerospace Engineering, Indian Institute of Technology, Hyderabad**

Date & Time: **19th February, 2020, Wednesday, 11:30 hrs**

Venue: **MDL Seminar Hall, MMG**

All are invited!

Tea will be served at 11:15 hrs

(IIM Kalpakkam Chapter)

Abstract

Experimental set-ups have been developed to facilitate impact mechanics research at IIT Hyderabad. The following capabilities have been developed: Split-Hopkinson Compression bar, Split-Hopkinson tension bar, underwater shock simulator and sand impact setup. Split-Hopkinson bar set-ups are used to characterize the high strain rate response of materials. The underwater shock simulator provides a means of applying pressure waves on structures that are representative of explosions in water. The challenges, mechanics, validation and future prospects of these experimental set-ups will be discussed. In a split-Hopkinson compression set-up, the striker, which impacts on the incident bar, is usually smaller in diameter than the pneumatic gun barrel through which it is propelled. Hence, the striker is usually supported using sabots in the barrel. Our recent experiments show that depending on the geometry of the sabot, some additional distortion of the incident signals also takes place. The causes of these distortions and their remedies will be discussed. Using the under-water shock simulator, we are able to generate pressure pulses of magnitude 250 bar and a decay period of 1 ms. Stainless steel plates of thickness 0.4 mm are subjected to these pressure waves to understand the mode of deformation. Procedures to validate the numerical models from the outcomes of these experiments will be presented.