



# FLUID AND PARTICLE MECHANICS

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**INTENDED AUDIENCE:** Any interested Learners

**INDUSTRY SUPPORT :** Chemical process industries

**COURSE OUTLINE :**

This course introduces the concepts of fluid and particle mechanics and demonstrates their applications.

**ABOUT INSTRUCTOR :**

Prof. Madivala G. Basavaraj is Associate Professor, Department of Chemical Engineering, Indian Institute of Technology- Madras. Before joining IIT-Madras in February 2011, I spent 3 months as visiting fellow at KULeuven (Belgium) in Prof. Jan Vermants group. I was a postdoctoral researcher with Prof. Norman J. Wagner at the University of Delaware (USA). I studied chemical engineering at SIT, Tumkur (Bangalore University), and received my M.S (Research) from IISc, Bangalore, by working on the determination of local dispersion coefficient and local holdup in a packed bed using X-rays. My PhD in chemical engineering is from KULeuven, Belgium (Prof. Jan Vermant). My PhD thesis was on - Tailoring colloidal gel rheology in bulk and at interfaces: Exploiting shape and surface chemistry effects.

Prof. Sumesh is interested in understanding soft and living (or active) fluids. This categorisation of matter is relatively recent, but it offers new and exciting physics that often leads to novel and unconventional engineering applications. Now I am working as Assistant Professor at Indian Institute of Technology Madras . 2007-2012 Doctor of Philosophy JNCASR Bangalore 2002-2004 Master of Technology IIT Kanpur. 1998-2002 Bachelor of Technology, Government Engineering College, Thrissur

**COURSE PLAN :**

**Week 1:** Introduction to Navier Stokes (NS) equations and their exact solutions, Poiseuille flow

**Week 2:** Taylor Couette flow, Rheology

**Week 3:** Dimensional analysis

**Week 4:** Turbulent Flow

**Week 5:** Friction losses, Moody's chart

**Week 6:** Boundary layer theory

**Week 7:** Introduction to Particles, their characterization

**Week 8:** Particulate Phenomena – Brownian motion and phoresis

**Week 9:** Motion of particles in a fluid, terminal velocity, particle separation

**Week 10:** Sedimentation of dilute, concentrated and flocculated dispersions

**Week 11:** Packed and Fluidized Beds

**Week 12:** Filtration