



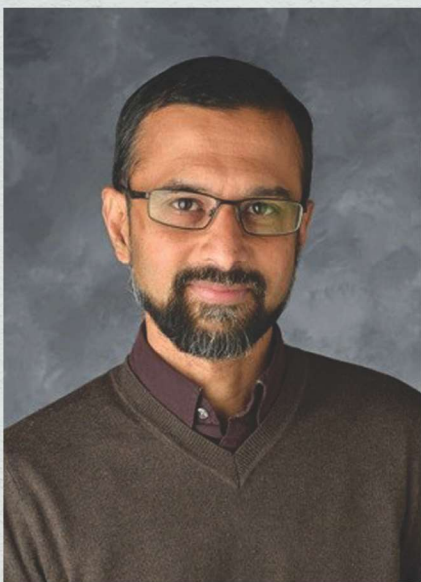
# Indian Institute of Technology Kanpur

## INSTITUTE LECTURE SERIES

January 13, 2023 (Friday) | 6.00 pm | L - 18

**Speaker: Prof. H. S. Udaykumar**

**Talk Title: Image-based modeling of cardiovascular systems using a level-set based Cartesian grid**



### About the Speaker

Udaykumar is Roy J. Carver professor of mechanical engineering and associate dean for graduate programs, research and faculty at the University of Iowa. He obtained a BTech from the Indian Institute of Technology Madras and PhD from the University of Florida (Gainesville). His research focus is on modeling and simulation of a wide range of moving boundary problems in thermomechanical systems, ranging from phase change thermal storage, biomedical applications involving cardiovascular and gastrointestinal mechanics, energetic material dynamics in propulsion and munitions, and multiphase flows at all speeds. He has published over 150 journal papers in varied topic areas of biomedical and mechanical engineering.

He has been supported by grants from NSF, Whitaker Foundation Biomedical Engineering Grant, NIH, VA Research grants and multiple concurrent grants from various DoD agencies. At Iowa and at universities in Hong Kong he has taught courses ranging from Fundamental Thermodynamics for first year undergraduates, to Shock Detonation Physics for advanced PhD students. He has also lectured frequently in public venues as well as in courses on the intersection of climate and environment, from the point of view of energy use.

### Abstract of the Talk

In various biomedical applications, particularly for modeling outcomes and interventions for patient-specific treatment/surgery, one needs to be able to predict fluid-structure interactions in complex geometries. These geometries may be derived directly from a variety of image processing modalities, such as CT, MRI, or even optical image acquisition. In this talk, the speaker will present a seamless methodology to integrate image-derived geometries (including video for moving/deforming geometries, such as the motion of the heart or GI tract) with flow and structure solvers. This allows for a fast, single-step approach to simulate the behavior of the imaged systems. He will also show capabilities to perform “virtual surgical interventions” for surgical planning. With the advent of artificial intelligence this tool opens up the possibility of using machine learning to explore the space of design variables that can guide more effective treatment/surgery targeting towards a specific patient.

All are cordially invited to attend

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