IITMZ Seminar Series

Friday, 21 November 2025 | 4:00 PM | IITMZ Auditorium

Speaker:

Prof. Sridharakumar Narasimhan

Talk Title:

Analysis of Potential Flow Networks: Variations in Transport Time with Discrete, Continuous & Selfish Operation

Abstract:

In potential flow networks, the equilibrium flow rates are usually not proportional to the demands and flow control elements are required to regulate the flow. The control elements can broadly be classified into two types – discrete and continuous. Discrete control elements can have only two operational states: fully open or fully closed. On the other hand, continuous control elements may be operated in any intermediate position in addition to the fully open and fully closed states. Naturally, with their increased flexibility, continuous control elements can provide better network performance, but to what extent?

We consider a class of branched networks with a single source and multiple sinks. The potential drop across edges is given by a nonlinear relationship with the flow across the edge. The results point to the role of network topology in the variations in operational time. Further analysis reveals that the selfish operation of a network with continuous control valves has the same bounds on the price of anarchy.

Speaker Biography:

Sridharakumar Narasimhan obtained his MTech and PhD. in Chemical Engineering from IIT Bombay (India) and Clarkson University (USA) respectively. He is currently a Professor at the Department of Data Science and Artificial Intelligence at IIT Madras, India, and serves as Visiting Faculty at IITM Zanzibar. His research interests lie in the area of cyber physical systems, process systems engineering, machine learning and artificial intelligence with applications to water distribution networks, pipeline networks and reaction networks.