ICTS | INTERNATIONAL CENTRE for THEORETICAL SCIENCES

TATA INSTITUTE OF FUNDAMENTAL RESEARCH

ICTS Seminar (HYBRID)

Title : Motion Planning for 1D Parabolic PDEs

Speaker : Vivek Natarajan (IIT Bombay)

Date : Thursday, 21st September, 2023

Time : 11:30 AM (IST)

Abstract : In this talk, we will discuss a solution to the problem of finding an input signal which transfers a linear boundary controlled 1D parabolic PDE, with spatially-varying coefficients, from a given initial state to a desired final state. The initial and final states have certain smoothness and the transfer must occur over a given time interval. We address this motion planning problem by first discretizing the spatial derivatives in the parabolic equation using the finite-difference approximation to obtain a linear ODE in time. Then using the flatness approach we construct an input signal that transfers this ODE between states determined by the initial and final states of the parabolic equation. We prove that, as the discretization step size converges to zero, this input signal converges to a limiting input signal which can perform the desired transfer for the parabolic equation. Using this approach we can construct input signals which transfer the parabolic equation from one steady-state to another. We also show that this approach yields a new proof for the null controllability of 1D linear parabolic equations containing discontinuous coefficients.

Venue : **Offline:** Madhava Lecture Hall (ICTS)

Online: Please click the below link to join the seminar

https://icts-res-in.zoom.us/j/85474958071?pwd=ekp6RDZVNGI4ckdjNk1LSER0cXhWdz09

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