

SIMION STOILOW INSTITUTE OF MATHEMATICS OF THE ROMANIAN ACADEMY

IMAR Monthly Lecture

Reachable spaces for infinite dimensional linear systems

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Wednesday, June 18, 2025, 12:00

IMAR, *Miron Nicolescu* amphitheater

Abstract: In control theory, one crucial problem is determining all states that can be reached from a given initial state at a specified time. While this problem has been well-addressed for finite-dimensional, linear, time-invariant systems since Kalman's work in 1963, it has remained elusive for infinite-dimensional systems. Notably, even for simple systems such as the one-dimensional heat equation with boundary control, a complete solution was only achieved recently in 2021.

This presentation will cover recent advancements in this field, starting with general properties, valid for all linear time-invariant systems. We will then explore the methodology used to fully characterize the reachable space for the one-dimensional heat equation and discuss potential extensions to systems described by other parabolic equations. Finally, we will highlight applications of this theory in solving norm and time-optimal control problems.