

# How to prove controllability of a system with fewer controls than components ?

*jeudi 12 décembre 2024 15:05 (30 minutes)*

Given an ODE or a PDE, we may ask whether we can achieve a prescribed behavior for the solution by acting on the system through a control (e.g., a source term). This is the goal of controllability theory in a nutshell. Controllability can be challenging when there are fewer controls than components in the system. We will start by examining the case of ODEs (Kalman rank condition), then consider parabolic equations in 1D (moment method), and finally, if time permits, discuss the multi-dimensional case in specific geometries.

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