



復旦大學
FUDAN UNIVERSITY

Applied Math
Ph.D. Seminar

Localized and Degenerate Controls for the Incompressible Navier–Stokes System

Speaker: Manuel Rissel (Shanghai New York University)

Time: 2023-04-13, 16:10 to 17:00

Location: Rm 1801, Guanghua East Tower

Mentor: Vahagn Nersesyan

Abstract: We discuss the global approximate controllability of the two-dimensional incompressible Navier–Stokes system driven by a physically localized and degenerate force. In other words, the fluid motion is regulated via four scalar control parameters that depend only on time and appear as coefficients in an effectively constructed driving force supported in a given subdomain. The task at hand is motivated by a well-known open problem due to A. A. Agrachev and a partial answer to his question shall be presented. Our idea consists of squeezing low mode controls into a small region, essentially by tracking their actions along the characteristic curves of a linearized vorticity equation. In this way, through explicit constructions and by connecting J.-M. Coron’s return method with recent concepts from geometric control, the original controllability problem for the nonlinear Navier–Stokes system is reduced to one for a linear transport equation steered by a finite-dimensional force acting in the whole domain.