

Control Problems: viscous Burgers-particle system

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Abstract

In this talk, I will discuss about the controllability of a one-dimensional fluid-particle interaction model where the fluid follows the viscous Burgers equation and the point mass obeys Newton's second law. We prove the null controllability for the velocity of the fluid and the particle and an approximate controllability for the position of the particle with a control variable acting only on the particle. We also discuss the fact that we can achieve this controllability result in a uniform time for all initial data and without any smallness assumptions on the initial data.

Suggested reading:

1. Juan Luis Vazquez and Enrique Zuazua. *Large time behavior for a simplified 1D model of fluid-solid interaction*. Comm. Partial Differential Equations, 28(9-10):1705–1738, 2003.
2. Nicolae Cindea, Sorin Micu, Ionel Roventa, Marius Tucsnak, *Particle supported control of a fluid-particle system*, J. Math. Pures Appl. (9) 104 (2) (2015) 311–353.
3. M. Ramaswamy, A. Roy and T. Takahashi. *Remark on the global null controllability for a viscous Burgers-particle system with particle supported control*, Applied Mathematics Letters (2020), Volume 107.