LOCAL EXACT CONTROLLABILITY OF THE ONE-DIMENSIONAL COMPRESSIBLE NAVIER-STOKES EQUATION

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EXTENDED ABSTRACT.

Main results. We study the boundary controllability of the one-dimensional isentropic compressible Navier-Stokes equation in an interval:

$$\begin{cases} \partial_t \rho + \partial_x(\rho u) = 0 \text{ in } (0,T)\times(0,L), \\ \rho(\partial_t u + u\partial_x u) - \nu\partial^2_{xx} u + \partial_x p(\rho) = 0 \text{ in } (0,T)\times(0,L). \end{cases} \tag{0.1}$$

In this equation $\rho = \rho(t,x) > 0$ is the local density of the fluid, $u = u(t,x)$ is its velocity, and $p = p(\rho)$ is the pressure, supposed to satisfy $p'(\rho) > 0$, for instance

$$p(\rho) = \rho^\gamma, \quad \gamma \geq 1. \tag{0.2}$$

Finally, $\nu > 0$ is the viscosity coefficient, typically $\nu = 1$.

The controls are the boundary values on $x = 0$ and $x = L$ and the "entering" density ρ (its value on $x = 0$ or $x = L$, depending on the sign of $u(t,0)$ and $u(t,L)$).

We obtain a result of local exact controllability towards constant states $(\overline{\rho}, \overline{u})$, provided that $\overline{u} \neq 0$, in time $T > L/|\overline{u}|$. This corresponds to the paper [1].

REFERENCES

[1] S. Ervedoza, O. Glass, S. Guerrero, J.-P. Puel, Local exact controllability for the 1-D compressible Navier-Stokes equation, preprint 2011, to be published in *Arch. Rational Mech. Anal.*

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