

On the local exact controllability of the 1-d compressible Navier-Stokes equation

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In this talk, I will present some recent results obtained in collaboration with O. Glass, S. Guerrero and J.-P. Puel concerning the local exact controllability to trajectory of the 1-d compressible Navier-Stokes equation.

In particular, we obtain positive results under some suitable geometric conditions on the flow associated to the target trajectory, which in particular requires that the time T is large enough to allow all the particles of the domain to get outside the domain before the time T . Our approach is based on a fixed point argument and more precisely on the controllability property of a system of equations almost corresponding to the linearized equations. The main difficulty of our work then consists in deriving Carleman estimates adapted to the flow of the target trajectory and to derive suitable weighted estimates for both the controlled density and velocity. This is done in particular by the introduction of the so-called effective velocity, which combines the velocity and the gradient of the density.

References

- [1] *S. Ervedoza, O. Glass, S. Guerrero, J.-P. Puel*: Local exact controllability for the one-dimensional compressible Navier-Stokes equation. *Arch. Ration. Mech. Anal.* *206* (2012), 189–238.