Stability of contact discontinuities for the nonisentropic Euler equations in two space dimensions

Paola Trebeschi - *University of Brescia*

Joint work with Alessandro Morando (University of Brescia)

Motivated by a recent result obtained by Coulombel and Secchi [1], we study the linear stability of contact discontinuities for the nonisentropic Euler equations. We consider supersonic discontinuities which are weakly stable and we prove an energy estimate for the Euler system linearized around a given constant discontinuity. Since the problem is characteristic, we obtain a loss of control in the trace of the solution; more precisely, the loss of control is only on the tangential velocity, which corresponds to the characteristic part of the solution. Furthermore, the loss of derivatives is even related to the failure of the uniform Kreiss-Lopatinskii condition, as well as to the multiplicity of the zeros of the Lopatinskii determinant. Differently from the isentropic case treated in [1], in which the zeros of Lopatinskii determinant are always simple, we find a critical value for the tangential velocity of the constant equilibrium state, which produces a double zero. Hence, in this critical case, we get a further loss of derivatives.

The result obtained in the constant case is the crucial step towards proving the similar result for the variable coefficients case, which is still in progress.

References

[1] J. F. Coulombel, P. Secchi The stability of compressible vortex sheets in two space dimensions. *Indiana Univ. Math. J.*, **53** (2004), pp. 941-1012.

[2] J. F. Coulombel, P. Secchi. On the transition to instability for compressible vortex sheets. *Proc. Roy. Soc. Edinburgh* Sect. A **134** (2004), pp. 885-892.

[3] J. F. Coulombel, A. Morando Stability of contact discontinuities for the nonisentropic Euler equations. *Ann. Univ. Ferrara* Sez. VII (N.S.) **50** (2004), pp. 79-90.

[4] A. Morando, P. Trebeschi The stability of conctact discontinuities for the nonisentropic Euler equations in two space dimension . *In preparation*