NON–STANDARD SOLUTIONS OF THE COMPRESSIBLE EULER SYSTEM

ELISABETTA CHIODAROLI

The deceivingly simple–looking compressible Euler equations of gas dynamics have a long history of important contributions over more than two centuries. If we allow for discontinuous solutions, uniqueness and stability are lost. In order to restore such properties further restrictions on weak solutions have been proposed in the form of entropy inequalities. In this talk, we will discuss some counterexamples to the well–posedness theory of entropy solutions to the multi–dimensional compressible Euler equations. First, we show failure of uniqueness on a finite–time interval for entropy solutions starting from any continuously differentiable initial density and suitably constructed initial linear momenta. In other words, we prove that there exist *wild initial data* allowing for infinitely many distinct entropy weak solutions of the compressible Euler system. Finally, we present a new upshot: a classical Riemann datum is a *wild* initial datum in 2 space–dimensions. All our methods are inspired by a new analysis of the incompressible Euler equations recently carried out by De Lellis and Székelyhidi and based on a revisited "h-principle".