Zero dissipation limit to rarefaction wave with vacuum for 1-D compressible Navier-Stokes equations

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In this talk, we show the zero dissipation limit to rarefaction wave with vacuum for the compressible Navier-Stokes equations. It is well-known that one-dimensional compressible heat-conductive gas dynamics has three elementary waves, i.e., shock wave, contact discontinuity wave and rarefaction wave. Among the three waves, only the rarefaction wave can be connected to vacuum. Given a rarefaction wave with one-side vacuum state to the compressible Euler equations, we can construct a sequence of solutions to one-dimensional compressible Navier-Stokes equations which converge to the above rarefaction wave with vacuum as the viscosity tends to zero. Moreover, the uniform convergence rate is obtained. The proof consists of a scaling argument and elementary energy analysis based on the underlying rarefaction wave structures.

References

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