Shocked Heterogeneous Flows with Heat Conduction

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Heterogeneous flows exist across a wide range of scales in our galaxy. The study on how they interact with shocks can be crucial in broadening our understanding of the structure and characteristics of interstellar medium. A recent study by our group on shock interactions with multiple clumps without heat conduction have revealed dynamic behavior be classified into two different categories: when the clumps are "sparse" and when the clumps are "dense", with critical clump density playing a key role in determining the behavior of the shock-multiclump interaction. The lack of heat conduction in these models is a major limitation as the mass mixing rate between a single clump and the ambient medium can be greatly affected by the presenting heat conduction even without magnetic field. In this presentation, we consider the interaction of a planar shock with a heterogeneous media including the effects of heat conduction and radiative cooling. Simulations are carried out on situations when clump density is greater than the critical density (dense) and situations when clump density is less than the critical density (sparse). We include the effects of magnetic fields in different geometries. We use the AMR MHD code with the addition of HYPRE as the linear solver for heat conduction.

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