[IM-07] Galactic Spiral Shocks with Thermal Instability: Preliminary Results on 2-Dimensional Simulations

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We investigate nonlinear evolution of gas flows across galactic spiral shocks subject to interstellar cooling and heating using two-dimensional numerical simulations. We model the gaseous medium as a non-self-gravitating, unmagnetized fluid in vertically stratified disks, and solve its interaction with a stellar spiral potential in a local frame comoving with the spiral pattern. The gas initially satisfies both hydrostatic and thermal equilibrium. As the amplitude of spiral potential increases, a vertically curved spiral shock develops. Subsequently the shock show strong flapping motions due in part to the interplay between the vertical disk oscillation and shock crossings of the gas, driving random kinetic energy into the gas. The random vertical motions of the gas can also be generated by infall of clumps formed at mid-latitude shock fronts, although not sufficient to explain the observed scale heights of the cold neutral medium. We discuss the preliminary results of the current 2D spiral shock models in comparison with those of our previous 1D models with thermal instability and 2D isothermal models.

[IM-08] The Jeans-Parker Instability in A Turbulent Medium

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To investigate how realistically the pressure prescription, $p = \rho v_{rms}^2$, with constant vrms could describe dynamics of the galactic interstellar medium, we perturbed, at regular time intervals, the velocity field of a magnetized, isothermal, gaseous disk with turbulence power spectrum of the form, $P(k; v^2) = P_o \exp[-(k-k_c)^2/D^2]$, and followed development of the Jeans-Parker instability in the disk, which is under the influence of both self and external gravities. The process of structure formation for the turbulent disk will be compared with the non-turbulent case. We will also construct momentum flux tensor, from which one may judge how good an equation of state the ram pressure expression could be. Power spectrum of the resulting fields of kinetic energy will be compared with that of the input turbulence, and be analyzed in terms of the cloudlet rms velocity, the turbulence input power P_o, and the input frequency k_c. We will also examine whether the resulting power spectrum and momentum flux tensor depend on vertical distance from the disk mid-plane.