

Formation of Dense, Cold Loops by Parker Instability in Galactic Gas Disks

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We performed two dimensional numerical simulations of Parker instability taking into account the cooling and heating functions of the interstellar medium (Inoue et al. 2006). Our numerical experiment is based on the simulation code "CANS+" in which the HLLD Riemann solver (Miyoshi & Kusano 2005) is used to solve the MHD equations. We found that the cold, dense filaments formed at the valley of magnetic field lines by Parker instability coupled with the cooling instability are deformed into loops of dense, cold gas when the Ram pressure at the left- and right-hand side of the filament is different. The maximum number density and the lowest temperature of cold, dense filament at 100Myrs is about 200 per cubic cm and 50K, respectively. These results support the model in which thermal instability triggered in the dense region formed by Parker instability is responsible for the formation of molecular loops found in the Galactic center region (e.g., Fukui et al. 2006).