P110a Massive Core/Star Formation Triggered by Cloud-Cloud Collision IV: Effect of Magnetic Field in High-Speed Collisions

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We extend our study of effect of magnetic field on massive core formation to high-speed collision of unequal molecular clouds by performing magnetohydrodynamic simulations with sub-parsec resolution (0.015 pc) that can resolve the molecular cores. Initial clouds with the typical gas density of the molecular clouds are assumed to be immersed in various uniform magnetic fields, and turbulence is generated in those clouds. We assume a higher collision speed of 20 km s^{-1} that is in the range of typically observed collision speeds 10-20 km s^{-1} and compare the results with our 10 km s^{-1} results. We identify gas clumps with gas densities greater than 5×10^{-20} g cm^{-3} as the dense cores and trace them throughout the simulations to investigate their mass evolution and gravitational boundness. Unlike our 10 km s^{-1} cases in which we found more massive bound core formation in 4.0 µG magnetic field case than 0.1 µG case due to suppression of the nonlinear thin shell instability by strong magnetic field, in our 20 km s^{-1} cases we find that very small number of massive bound cores are formed in both initial magnetic field cases. We simulate three times massive cloud-cloud collision with 20 km s^{-1} collision speed. We find more massive bound cores and a greater number of massive bound cores in 4.0 µG case than in 0.1 µG case in such cloud-cloud collisions. We will discuss a possible relation between massive core formation, magnetic field and colliding cloud masses in the high-speed collisions.