Z308a Massive Star Formation triggered by Cloud-Cloud Collision: Effects of Magnetic Field and Collision Speed

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We study the effects of the magnetic field and the collision speed on the massive star formation triggered by the cloud-cloud collision. We perform sub parsec (≈ 0.015pc) magneto-hydrodynamic simulations of two unequal molecular clouds with internal turbulence. We assume initial uniform magnetic fields of various strengths (0.1, 4 and 10μG) and with three different directions which are parallel, perpendicular, and oblique to the collision axis. We generate turbulent magnetic fields by developing turbulent motion in initial uniform clouds before the collision. We assume two collision speeds (10 and 20kms^{-1}). During the collision of the clouds, the shock wave forms at the interface of clouds, and dense cores form in the shocked cloud medium. In the past meeting, we have reported that for the 10kms^{-1} cases more massive dense bound cores are formed in the 4μG cases than the 0.1μG cases. In the 4μG cases, especially with perpendicular and oblique initial magnetic field, more massive cores form than in the 0.1μG cases due to suppression of nonlinear thin-shell instability by magnetic field compared to the 0.1μG cases. In this meeting, we report that for the 20kms^{-1} cases the collision proceeds too quickly to form dense cores. However, in 10.0μG cases, we find the formation of the massive cores which are expected to form the massive stars even for the 20kms^{-1} cases. The 10.0μG initial magnetic field has a positive effect on the massive core formation, and it can overcome the negative effect of the 20kms^{-1} collision speed. We will discuss the implications of our results for the massive star formation.