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Filamentary structure formation in the Interstellar Radiation Field (ISRF)

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Abstract. A new mechanism is proposed for the formation of filament/core structure by ISRF and clumpy molecular cloud interaction. The derived characterizes of the filament/core network is consistent with that produced by the compressive forcing turbulence model.

Keywords. ISM: clouds — ISM: evolution — ISM: structure

The filamentary networks revealed by Herschel over the entire range of galactic latitudes (e.g. Molinari *et al.* 2010) indicate a link to the surrounding ISRFs (e.g. Men'shchikov *et al.* 2010). We probe a new mechanism for ISRF(FUV) induced filamentary network formation by using an existing numerical code (Nelson & Langer 1997).

The four columns in the middle panel in Fig. 1 (from left to right) are the cross section density profiles from four different simulations for a clumpy cloud of an initial 40 solar masses and radius of 1.2 pc, subject to FUV radiation fluxes of 0.2, 0.6, 1 and 2 times the Habing constant respectively. A density contrast of 3 orders of magnitude is reached after 1.14, 1.07, 0.97 and 0.75 Myrs respectively. The right panel in Fig. 1 is the velocity vector field overlaid the cross section density profile corresponding to the second left column in the middle panel of the Fig. 1, which bears a resemblance to that produced by the compressive turbulent forcing model (Federrath *et al.* 2010).

Our simulation result shows that the interaction between ISRF and a clumpy molecular cloud can be taken as a possible mechanism for filamentary network formation. More simulation results, discussions and references can be found in a paper to be submitted.

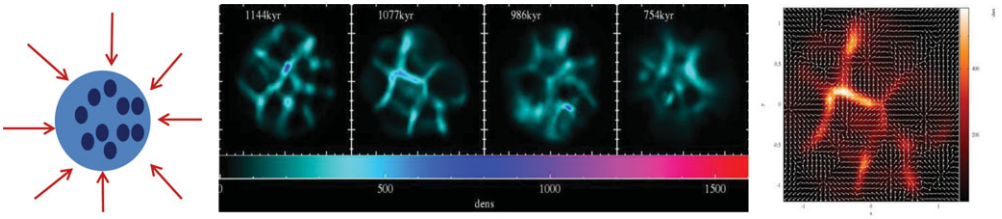

Figure 1. The left panel is the initial configuration of the simulation, the rest are the results.

References

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