Suppression of self-organized structure coarsening in homogenous isotropic turbulence YOUHEI TAKAGI, Osaka University — Self-organized structure by spinodal decomposition is often seen in quenched binary mixture. Complex network structure is formed through coarsening process of self-organized structure when the phase separation due to spinodal decomposition proceeds. The phase separation governed by the Cahn-Hilliard equation have been well investigated for stationary fluid in previous studies, however, the turbulent effect on the formation of structures was not fully discussed. In this study, we carried out a numerical simulation for homogenous isotropic turbulence with phase separation, the relation between turbulent vortex formation and self-organized structure coarsening. The governing equations are incompressible Navier-Stokes equation considering phase separation force and Cahn-Hilliard equation with the chemical potential based on the Landau-Ginzburg free energy. From the identification and visualization of turbulent structures, it was found that the local entrainment of small eddy structure suppressed the coarsening process of self-organized structure. The energy used in phase separation was related to the initial process of vortex sheet-tube transition in turbulent flow, and the energy cascade from large turbulent structure to small eddy was different from that without phase separation.

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