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Suppression of turbulent energy cascade due to phase separation in homogenous binary mixture fluid[1] YOUHEI TAKAGI, SACHIYA OKAMOTO, Osaka University — When a multi-component fluid mixture becomes themophysically unstable state by quenching from well-melting condition, phase separation due to spinodal decomposition occurs, and a self-organized structure is formed. During phase separation, free energy is consumed for the structure formation. In our previous report, the phase separation in homogenous turbulence was numerically simulated and the coarsening process of phase separation was discussed. In this study, we extended our numerical model to a high Schmidt number fluid corresponding to actual polymer solution. The governing equations were continuity, Navier-Stokes, and Chan-Hiliard equations as same as our previous report. The flow filed was an isotropic homogenous turbulence, and the dimensionless parameters in the Chan-Hilliard equation were estimated based on the thermophysical condition of binary mixture. From the numerical results, it was found that turbulent energy cascade was drastically suppressed in the inertial subrange by phase separation for the high Schmidt number flow. By using the identification of turbulent and phase separation structure, we discussed the relation between total energy balance and the structures formation processes.

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