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Condensing aerosol Dynamics in homogeneous isotropic turbulence AMJAD ALSHAARAWI, ANTONIO ATTILI, FABRIZIO BISETTI, King Abdullah University of Science and Technology, CLEAN COMBUSTION RESEARCH CENTER TEAM — The interaction of a condensing aerosol with homogeneous isotropic turbulence is simulated at $\mathrm{Re}_\lambda \approx 95$. The simulation consists of a three-dimensional direct numerical simulation of homogeneous isotropic turbulence with a statistically stationary forced velocity field. Patches of dry and cold gas mix with patches of hot carrier gas saturated with vapor of a condensable species, inducing the homogeneous nucleation of particles due to supersaturation. An approach based on the quadrature method of moments and a Lagrangian numerical scheme is adopted for the transport and dynamics of the liquid droplets [Attili & Bisetti, Comp. Fluids 84, 2013; Zhou *et al.*, Phys. Fluids 26, 2014]. Two regimes related to the eddy turnover timescale are observed, i.e., a nucleation regime and a consumption regime [Alshaarawi & Bisetti, J. Aerosol Sci. 81, 2015]. In the nucleation regime, at short eddy turnover timescales, mixing is fast enough to suppress nucleation by mixing the fluid to the mean state at which nucleation vanishes. In the consumption regime, at long eddy turnover timescales, mixing is slow and nucleation continues until it is suppressed by the consumption of the vapor phase due to the growth of the droplets.

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