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On the effects of isotropic turbulence on the evaporation rate of a liquid droplet MICHAEL DODD, ANTONINO FERRANTE, University of Washington, Seattle — Our objective is to explain the effects of isotropic turbulence on the vaporization rate of a liquid droplet in conditions that are relevant to spray combustion applications. To this end, we have performed direct numerical simulation (DNS) of a single droplet in homogeneous isotropic turbulence using the volume-of-fluid method for resolving fully the process of momentum, heat, and mass transfer between the liquid droplet and the gas. The simulations were performed using 1024^3 grid points. The effect of turbulence on the droplet vaporization rate is investigated by varying the gas-phase Reynolds number based on the Taylor microscale, Re_λ. Re_λ is increased from 0 to 75 by increasing the r.m.s. velocity of the gas phase while keeping all other physical properties constant. We will present the droplet evaporation rate as a function of turbulence Reynolds number and investigate the physical mechanisms.

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