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**Viscosity-modulated breakup and coalescence of large drops in bounded turbulence** ALESSIO ROCCON, FRANCESCO ZONTA, MARCO DE PAOLI, ALFREDO SOLDATI, TU Wien, Institute of Fluid Mechanics and Heat Transfer — In this work, we examine the influence of viscosity on breakup and coalescence of a swarm of large drops in a wall-bounded turbulent flow. We consider several values of surface tension and a wide range of drops to fluid viscosity ratios $\lambda = \eta_d/\eta_c$ while we maintain the same density for drops and carrier fluids. Drops can coalesce and break following a complex dynamics that is primarily controlled by the interplay between turbulence fluctuations (measured by $Re_\tau$), surface tension (measured by $We$) and $\lambda$. We use Direct Numerical Simulations (DNS) of turbulence coupled with a Phase Field Method (PFM) to describe the drops dynamics. We observe a consistent action of increasing $\lambda$, which, especially for the larger Weber numbers decreases significantly the breakup rate of the drops. Qualitatively, an increase of drop viscosity decreases the breakup rate, very much like an increase of surface tension does. The mechanism by which drop viscosity acts is a modulation of turbulence fluctuations inside the drop, which reduces the work surface tension has to do to preserve drop integrity. We will also consider the case of non-coalescing drops in which a surfactant is able to inhibit the coalescence.

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