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Coalescence and break-up of large droplets in turbulent channel flow[1] LUCA SCARBOLO, FEDERICO BIANCO, ALFREDO SOLDATI, Dep. Elect., Manag. and Mechanical Engineering, University of Udine — The behaviour of large, deformable and coalescing droplets, released in a turbulent channel flow, has been numerically investigated with a Phase Field approach; focus has been put on droplet-droplet interactions and droplet fragmentation, enhanced by turbulent fluctuations. Two different dynamics of the dispersed phase may be observed depending on the Weber number (We). For small We surface tension balances turbulent shear; slightly deformed droplets, transported by the carrying fluid, may only coalesce. The analysis of the droplet pair distance shows that the geometrical separation of the droplets is a leading factor for the coalescence regime determination. On the contrary, if We is larger than a critical value, a dynamic equilibrium between coalescences and breakups is shown. In this regime, in line with seminal work of Hinze (1955) and recent numerical simulations of Perlekar et al. (2012), We controls the critical stable diameter of droplets as well as the average distance between droplet pairs.

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