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Cohesive Sediment in Turbulence KUNPENG ZHAO, FLORIAN POMES, RAPHAEL OUILLON, THOMAS KOELLNER, BERNHARD VOWINCKEL, ECKART MEIBURG, UC Santa Barbara — We investigate the balance between flocculation and break-up of cohesive particles in turbulent flows by means of grain-resolving direct numerical simulations. As a first step, we consider the model problem of inertial particles moving in a steady-state, cellular flow field consisting of counterrotating vortices. The dynamics of these particles are characterized by their Stokes number and Cohesion number, as well as by the ratio of their diameter to the vortex size. These one-way coupled simulations provide information on the competition between hydrodynamic, cohesive and collision forces, the equilibrium floc size distribution, and on the time scale of the floc formation process. We find that the equilibrium floc size grows with the Cohesion number, and that flocculation progresses most rapidly for a suitably defined Stokes number near unity. In a subsequent step, we explore how these findings translate to cohesive particles moving in homogeneous isotropic turbulence.

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