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Finite-sized Particles in Non-Dilute Convecting Suspensions: Efficient Numerical Approach to Sedimentation TOBIAS HÖINK, JÖRG SCHMALZL, ULRICH HANSEN, Institut f. Geophysik, WWU Münster, Germany
— The numerical simulation of a non-dilute suspension has to date been infeasible for particles that are smaller than the characteristic length scale of the fluid flow but sufficiently large so that Stokes' settling needs to be considered. We have developed an efficient algorithm that allows the numerical study of non-dilute suspensions in which such particles settle. Our approach considers a consistent settling velocity and the density contribution due to particle mass. We apply this method to 2D and 3D convection models and investigate emergent structures, resulting from the competing effects of convection and particle settling. For appropriately balanced forces we find three styles of motion: a temperature-dominated style where most particles remain suspended, a particle dominated style where the particles separate from the fluid and a style of repetitive motion.

Tobias Höink

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