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Consolidation of freshly deposited cohesive and noncohesive sediment: Particle-resolved simulations ECKART MEIBURG, BERNARD VOW-INCKEL, EDWARD BIEGERT, PAOLO LUZZATTO-FEGIZ, UC Santa Barbara — We analyze the consolidation of freshly deposited cohesive and noncohesive sediment by means of particle-resolved direct Navier-Stokes simulations based on the immersed boundary method. The computational model is parametrized by material properties and does not involve any arbitrary calibrations. We obtain the stress balance of the fluid-particle mixture from first principles and link it to the classical effective stress concept. The detailed data sets obtained from our simulations allow us to evaluate all terms of the derived stress balance. We compare the settling of cohesive sediment to its noncohesive counterpart, which corresponds to the settling of the individual primary particles. The simulation results yield a complete parametrization of the Gibson equation, which has been the method of choice to analyze self-weight consolidation.

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