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**DNS of finite-size heavy particles in vertical turbulent channel flow** MARKUS UHLMANN, Dept. Combustibles Fósiles, CIEMAT, 28040 Madrid, Spain — We consider the upward flow of an incompressible fluid in a vertical plane channel with suspended rigid spherical particles. In order to take into account finite-size effects, we perform "true" direct simulations, i.e. the particles are resolved by the grid, using the immersed boundary method of [Uhlmann, J. Comput. Phys.209(2):448-476, 2005]. The solid volume fraction is in the dilute regime ($\leq 0.01$), which allows for a simplified treatment of collisions. Our simulations are run in turbulent conditions, with the friction-velocity-based Reynolds number measuring around 200. The particle diameter corresponds to 9 wall units, equivalent to 14 mesh widths of our uniform grid. We have accumulated statistics in a relatively small bi-periodic domain of approximately 4 minimal flow units, including 512 particles. The Reynolds number based upon the particle diameter and the difference between the mean velocities of the two phases is around 150 in the bulk of the flow. In this contribution we will discuss the averaged flow quantities with respect to modifications of the near-wall turbulence structure. Correlation data along particle paths as well as flow visualizations will be presented.

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