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Drag reduction in turbulent channel laden with finite-size oblate spheroids.[1] MEHDI NIAZI ARDEKANI, KTH Royal Institute of Technology, PEDRO COSTA COLLABORATION, WIM-PAUL BREUGEM COLLABORATION, FRANCESCO PICANO COLLABORATION, LUCA BRANDT COLLABORATION — Suspensions of oblate rigid particles in a turbulent plane channel flow are investigated for different values of the particle volume fraction. We perform direct numerical simulations (DNS), using a direct-forcing immersed boundary method to account for the particle-fluid interactions, combined with a soft-sphere collision model and lubrication corrections for short-range particle-particle and particle-wall interactions. We show a clear drag reduction and turbulence attenuation in flows laden with oblate spheroids, both with respect to the single phase turbulent flow and to suspensions of rigid spheres. We explain the drag reduction by the lack of the particle layer at the wall, observed before for spherical particles. In addition, the special shape of the oblate particles creates a tendency to stay parallel to the wall in its vicinity, forming a shield of particles that prevents strong fluctuations in the outer layer to reach the wall and vice versa. Detailed statistics of the fluid and particle phase will be presented at the conference to explain the observed drag reduction.

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