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**Effects of Inter-Particle Collisions and Two-Way Coupling on Particle Deposition Velocity in a Turbulent Channel Flow** HOJJAT NASR, Carnegie Mellon University, GOODARZ AHMADI, JOHN MCLAUGHLIN, Clarkson University — This study was concerned with the effect of particle-particle collisions and two-way coupling on the particle deposition velocity in a turbulent channel flow. The time history of the instantaneous turbulent velocity vector was generated by the two-way coupled direct numerical simulation (DNS) of the Navier-Stokes equation via a pseudospectral method. The particle equation of motion included the Stokes drag, the Saffman lift, and the gravitational forces. The effect of particles on the flow was included in the analysis via a feedback force that acted on the fluid on the computational grid points. Several simulations for different particle relaxation times and particle mass loading were performed, and the effects of the inter-particle collisions and two-way coupling on the particle deposition velocity, fluid and particle fluctuating velocities, particle normal mean velocity, and particle concentration were determined. It was found that when particle-particle collisions were included in the computation, the particle deposition velocity increased. When the particle collision was neglected but the particle-fluid two-way coupling was accounted for, the particle deposition velocity decreased slightly. For the four-way coupling case, when both inter-particle collisions and two-way coupling effects were taken into account, the particle deposition velocity increased. Comparisons of the present simulation results with the available experimental data and earlier numerical results are also presented.

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