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Bead resuspension and saltation in a turbulent channel flow RENE VAN HOUT, Technion-Israel Institute of Technology — Resuspension and saltation of near neutrally buoyant, polystyrene beads in a turbulent boundary layer was studied using TR-PIV and PTV in a horizontal, water channel facility (Re = 7353). Near wall coherent structures were visualized using spatial distributions of vorticity and swirling strength in combination with instantaneous u_1u_2 correlations and u_1. Two case studies, (i) on resuspension and (ii) on saltation showed that lift-off coincided with vortex core passage creating an ejection-sweep cycle. In all cases, beads left the wall when immersed in near-wall ejections and exposed to positive shear. A high shear induced lift force coincided with bead lift-off while the Magnus force and translation induced lift were negligible. The wall-normal component of the drag force mostly opposed lift-off. The difference between resuspension and saltation was governed by the type of coherent structures the beads encountered when lifted out of the viscous sublayer. Resuspension occurred when beads were carried upwards by a combination of a strong, spatially coherent upstream fast moving flow structure and a downstream ejection. On the other hand, saltation was accompanied by similar albeit weaker and spatially less coherent near-wall turbulence structures.

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