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Eulerian-Lagrangian study of particle resuspension by a periodically-forced impinging jet[1] WEN WU, Queens Univ, GIOVANNI SOLIGO, CRISTIAN MARCHIOLI, Dipartimento Politecnico di Ingegneria e Architettura, Università degli Studi di Udine, ALFREDO SOLDATI, Institut für Strömungsmechanik und Wärmeübertragung, TU Wien, UGO PIOMELLI, Queens Univ — In this work, we investigate the mechanisms that govern particle resuspension in an impinging flow over surfaces covered with mobile sediments. An Eulerian-Lagrangian approach based on large-eddy simulation of turbulence, and one-way coupling Lagrangian-tracking of particles, is used to model a vertical impinging jet, to which a sequence of periodically-forced azimuthal vortices is superposed. We show how the dynamics of sediments is governed by their interaction with the turbulent structures (including the large-scale vortices) and the separated flow. After initial lift-up from the impingement surface, particles are accumulated in regions where near-wall vortices roll around the impinging azimuthal vortex, forming rib-like structures that either propel particles away from the azimuthal vortex or entrap them in the shear layer between the azimuthal and secondary vortices. We demonstrate that these trapped particles are more likely to reach the outer flow region and generate a persistent cloud of airborne particles.

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