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Identification of Scaling Parameters for Rotor-Induced Sediment Mobilization GINO PERROTTA, Univ of Maryland-College Park — Flow imaging and particle imaging velocimetry experiments were conducted in a water tank to investigate the effects of rotor wake and sediment characteristics on rotor-induced sediment mobilization during hover in ground effect. The two-phase flow was separated into carrier phase and dispersed phase. The carrier phase was studied using PIV to acquire time-resolved planar velocity measurements for a field of view within the rotor wake. The rotor-induced flow was confirmed to be dominated by blade tip vortices and was thus characterized in terms of the vortex properties. Vortices were identified using a nonlocal function and were fit to the Lamb-Oseen vortex velocity profile to evaluate size and strength. The rotor-induced flow was also characterized in terms of wall jet velocity and turbulent kinetic energy. The dispersed phase was separated from the carrier phase using image filtering procedures and was quantified by identifying mobilized sediment particles visible in the field of view. Candidate scaling parameters were created by combining rotor-induced sediment mobilization system characteristics. These candidate parameters were inspected for correlation with sediment mobilization. Three new scaling parameters are proposed and evaluated.

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