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A simplified analog for a rotorcraft-in-ground-effect flow using a forced impinging jet[1] JAYSON GEISER, KEN KIGER, University of Maryland — The phenomenon of rotorcraft brown-out is defined as the intense suspension and re-ingestion of sand during the take-off and landing of a rotor-lifted aircraft. To mitigate the problem of rotorcraft brown-out, the non-equilibrium sediment suspension process that occurs within a typical rotorcraft wake must be understood. We attempt to understand the most basic aspects of this complex flow through the use of an axisymmetric forced impinging jet. While this flow neglects the swirl component associated with a rotorcraft, it does reproduce the typical coherent vortex structures, and permits their repeatable generation within an axisymmetric mean stagnation flow. The goal of the current work is to determine the forcing conditions that produce isolated, but intense and repeatable structures that can be followed through their interaction with the wall boundary. Stereo PIV imaging is applied to detail the breakdown of a vortex ring in the wall jet zone. The secondary vortex generation and decay are observed experimentally with 3-D vector fields, and their results are interpreted with respect to their significance in the context of sediment mobilization.

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