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Dust Resuspension due to Idealized Foot Motion RITESH SHETH, CAROLINE BRAUD, HIROSHI HIGUCHI, MARK GLAUSER, H EZZAT KHALIFA, Syracuse — The air quality is affected by amount and types of particulate contaminants that are suspended in the air. The resuspension phenomena occur through two mechanisms: mechanical, where kinetic energy is transferred through direct contact from an impacting body or a vibrating surface, and aerodynamic, where dust particles are resuspended by the flow disturbance generated by the body. In this presentation we focus on aerodynamic resuspension of particles caused by walking. The foot movement is idealized and is either towards or away from a floor without touching it. As a first approach, a 15 cm diameter disk having the equivalent area to that of a human foot is used. The "foot" movement is driven vertically by a linear servo motor that controls the velocity, acceleration, stroke and deceleration (a typical vertical velocity is 0.5-1.0 m/s). A thin layer of dust is spread on a table relative to which the disk is allowed to move up and down. Flow visualizations show that both the upward and downward movements of the disk play an important role in the dust resuspension. A clear effect of radial jet and vortex dynamics on the particle resuspension is observed during the downward motion. In the wake of the rising disk, the particles were entrained upwards as a starting ring vortex formed. Quantitative PIV measurements will be performed to help further analyze the flow structure of this flow configuration.

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