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Near-wall aerodynamics of idealized model foot motion YOSHI KUBOTA, JOSEPH HALL, HIROSHI HIGUCHI, RITESH SHETH, MARK GLAUSER, EZZAT KHALIFA, Syracuse University — The air quality is affected by amounts and types of contaminant particles suspended in the air. The particulate matter reaches the respiratory system in an indoor environment by fist becoming detached, resupended and then entrained in the human micro-environment. The resuspension phenomena from the floor occur through either a ballistic mechanism, where kinetic energy is transferred to dust particles through direct contact, or an aerodynamic mechanism, where dust particles are resuspended by the flow generated by the body. In this study we focus on the aerodynamic resuspension of particles caused by walking. The foot motion is idealized and is either towards or away from a floor. A circular disk and an elongated plate having the equivalent area to that of a human foot are used. The foot motion is driven vertically by a linear servo motor that controls the velocity, acceleration, stroke and deceleration. The model velocity is based on the real foot motion. In addition to flow visualization, flowfield measurements were conducted with PIV. In the downstroke, results show a vortex impacting the wall creating the strong wall jet. In upstroke, the vortex generated behind the idealized foot exhibits the large magnitude of velocity. Experiment is continuing with a model more closely to simulating shoe geometry as well as incorporating the real foot kinetics. The results will be compared with the numerical simulation and analytical results.

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