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Modeling of Round Buoyancy Driven Particle Clouds. ALI ALNAHIT, NIGEL KAYE, Associate Professor of Civil Engineering, ABDUL KHAN, Professor of Civil Engineering — A numerical model was developed to investigate the dynamics of round buoyancy driven particle clouds in a quiescent ambient. The developed model was validated and then applied to a range of test cases including releases of positively/negatively buoyant particles. The cloud was modeled using the standard Morton et al. (1956) entrainment assumption, and the flow field induced by the cloud was approximated as a Hill's spherical vortex. The buoyancy of the cloud was calculated as the sum of the buoyancy contributed by all particles within the cloud. Individual particles were tracked using a particle tracking equation considering the forces acting on individual particles and the computed induced velocity field. Particle–particle interactions were modeled as both elastic and inelastic collisions. The turbulent dispersion of particles was also considered and estimated using a random walk model. The model was validated by comparing simulations with the experimental and numerical results of Wang et al. 2016. The limitations of the model were then discussed.

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