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Investigation of electric charge on inertial particle dynamics in turbulence[1] JIANG LU, RAYMOND SHAW, Michigan Technological University — The behavior of electrically charged, inertial particles in homogeneous, isotropic turbulence is investigated. Both like-charged and oppositely-charged particle interactions are considered. Direct numerical simulations (DNS) of turbulence in a periodic box using the pseudospectral numerical method are performed, with Lagrangian tracking of the particles. We study effects of mutual electrostatic repulsion and attraction on the particle dynamics, as quantified by the radial distribution function (RDF) and the radial relative velocity. For the like-charged particle case, the Coulomb force leads to a short range repulsion behavior and an RDF reminiscent of that for a dilute gas. For the oppositely-charged particle case, the Coulomb force increases the RDF beyond that already occurring for neutral inertial particles. For both cases, the relative velocities are calculated as a function of particle separation distance and show distinct deviations from the expected scaling within the dissipation range.

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