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Direct numerical simulations (DNS) of particles in spatially varying electric fields E. AMAH, NJIT, M. JANJUA, American University in Dubai, I.S. FISCHER, P. SINGH, NJIT — We have developed a direct numerical simulation (DNS) scheme to simulate the motion of dielectric particles suspended in a dielectric liquid in nonuniform electric fields. The motion of particles is tracked using a distributed Lagrange multiplier method (DLM) and the electric forces acting on the particles are calculated by an efficient scheme in which the Maxwell stress tensor (MST) is integrated over the surfaces of the particles to obtain the force. The code is validated by performing a convergence study and by comparing the particle trajectories in a dielectrophoretic cage with those given by the point-dipole method. We also show that the trajectories of the two or more interacting particles given by the MST method can be different from those obtained using the point-dipole method since the latter does not consider particle-particle interactions.

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