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Simulating Electric Double Layer Capacitance by Using Lattice Boltzmann Method NING SUN, DILIP GERSAPPE, Department of Materials Science and Engineering, Stony Brook University, Stony Brook, NY, 11794, USA — By using the Lattice Boltzmann Method (LBM) we studied diffuse-charge dynamics in electrochemical systems. We use the LBM to solve Poisson-Nernst-Planck equations (PNP) and Modified Poisson-Nernst-Planck equations (MPNP). The isotropic permittivity of electrolyte is modeled using the Booth model. The results show that both steric effect (MPNP) and isotropic permittivity (Booth model) can have large influence on diffuse-charge dynamics, especially when electrolyte concentration or applied potential is high. This model can be applied to simulate electric double layer capacitance of super capacitors with complex geometry and also incorporate other effects such as heat convection in a modular manner.

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