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DIRECT SIMULATION FOR TRANSPORT PHENOMENA OF COLLOIDAL DISPERSIONS: SMOOTHED PROFILE METHOD

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We developed a simulation scheme to a priori predict dynamic behaviors of colloidal dispersion called “Smoothed Profile method (SPM)". SPM provides a coupling scheme between continuum fluid dynamics and rigid-body dynamics through smoothed profile of colloidal particles. SPM for charged-colloidal dispersion in an electrolyte solution is formulated. Numerical results which assess electro-hydrodynamic interactions of colloidal dispersions are presented to validate SPM. Application of SPM is not restricted to a simple Newtonian solvent, but any constitutive model can be handled. Henceforth, it can be suitable to treat colloidal dispersions in complex fluids where solvent-mediated interaction dominate dynamical behaviors of colloids.