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Energy-Conserving Numerical Scheme for the Poisson-Nerst-Plank Equations

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Energy-Conserving Numerical Scheme for the Poisson-Nerst-Planck Equations. Preliminary report.

The Poisson-Nernst-Planck equations are a system of nonlinear partial differential equations that describe flow of charged particles in solution. In particular, we are interested in the transport of ions in the biological membrane proteins (ion channels). This work is about the design of numerical schemes that preserve exactly (up to roundoff error) a discretized form of the energy dynamics of the system. We will present a scheme that achieves the goal of preserving the energy dissipation law and some preliminary numerical results. (Received September 05, 2015)