

Abstract Submitted  
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**A Poisson-Boltzmann solver on Non-Graded Adaptive Grid with Robin boundary conditions on Irregular Domains** ASDIS HELGADOTTIR, FREDERIC GIBOU, UCSB — We introduce a second-order solver for the Poisson-Boltzmann equation in arbitrary geometry in two and three spatial dimensions. The Poisson-Boltzmann equation can be used to represent the electric potential of a solution and is, therefore, of great interest in micro fluidics. The method introduced differs from existing methods solving the Poisson-Boltzmann equation in the two following ways: First, non-graded Quadtree (in two spatial dimensions) and Octree (in three spatial dimensions) grid structures are used; Quadtree/Octree grid structures save a significant amount of computational power at no sacrifice in accuracy. Second, Robin boundary conditions are enforced at the irregular domain's boundary. The irregular domain is described implicitly and the grid does not need to conform to the domain's boundary, which makes grid generation straightforward and robust. The resulting matrix is an M-matrix, thus the linear system is invertible, leading to a simple and robust second- order accurate solver.

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