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Study of Dynamic Membrane Behavior in Applied DC Electric Field[1] PRASHANTA DUTTA, ADNAN MORSHED, Washington State University, MOHAMMAD HOSSAN, University of Central Oklahoma — Electrodeformation of vesicles can be used as a useful tool to understand the characteristics of biological soft matter, where vesicles immersed in a fluid medium are subjected to an applied electric field. The complex response of the vesicle membrane strongly depends on the conductivity of surrounding fluid, vesicle size and shape, and applied electric field We studied the electrodeformation of vesicles immersed in a fluid media under a short DC electric pulse. An immersed interface method is used to solve the electric field over the domain with conductive or non-conductive vesicles while an immersed boundary scheme is employed to solve fluid flow, fluid-solid interaction, membrane mechanics and vesicle movement. Force analysis on the membrane surface reveals almost linear relation with vesicle size, but highly nonlinear influence of applied field as well as the conductivity ratios inside and outside of the vesicle. Results also point towards an early linear deformation regime followed by an equilibrium stage for the membranes. Moreover, significant influence of the initial aspect ratio of the vesicle on the force distribution is observed across a range of conductivity ratios.

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Prashanta Dutta
Washington State University

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