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Physical and Design Parameters Influence On Nanoparticle DEP Dynamic Focusing SOPHIE LOIRE, FREDERIC BOTTAUSCI, IGOR MEZIC, University of California, Santa Barbara — The manipulation of biological objects from micrometer to nanometer scale particles plays an important role in many biological and colloidal science applications. As nanoparticles are subject to Brownian motion, their trapping is challenging. However, dynamic trapping can be achieved by using the combined effect of diffusion, fluid flow and electrical forces. We present numerical simulations and experiments on nanoparticle dielectrophoretic (DEP) trapping in a linear electrode array microchannel. We derived a dynamical model using an advection-diffusion equation where the advective term consists of the sum of a conservative (related to the fluid flow) and a non-conservative term (related to the DEP force). The numerical solution of this PDE predicts the intensity of the focusing of particles as small as 10 nm in diameter which fits our experimental measurements. We observe that the existence and location of the trapping regions depend not only on the size of the particles but also on the physical and design parameters. We characterize those influences.

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