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Effect of channel turn on the trajectory of an electrophoretic particle DUSTIN HOUSE, HAOXIANG LUO, Vanderbilt University — Streamlines of non-particle-laden flow are often used as a convenient method to predict the trajectory of particles driven through a microchannel by electrophoresis. However, the validity of this approach it is not clear when the channel geometry is complex and when the particle size is large compared to the characteristic length scale of the channel. To address this issue, we have developed an accurate numerical approach based on the boundary-element method to solve the coupled electric field, flow and particle motion. From this, we simulate a spherical particle moving in a bent cylindrical channel. In the simulation, both the particle and channel walls are non-conducting, and the electrical double layers adjacent to the solid surfaces are assumed to be thin with respect to the particle radius and to the particle-wall gap. The result shows that the particle trajectory deviates from the flow streamlines (in the absence of the particle) when the turning radius is small and the particle is close to the inner side of the turn. The effect of the particle-to-cylinder size ratio will be also be presented.

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