

Abstract Submitted
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Dispersion in channels with adsorption and desorption at walls¹

SUBHRA DUTTA, Northwestern University , SANDIP GHOSAL, Northwestern University (Mech. Eng.) — The transport of a species, in a microfluidic capillary of arbitrary but axially-invariant cross-sectional shape in the presence of an adsorption-desorption reaction on the capillary wall is studied, motivated by applications to capillary electrophoresis and open-tubular capillary electrochromatography. An asymptotic approach based on the long time limit is adopted. Numerical simulations are conducted for (a) an axially homogeneous flow with arbitrary cross-sectional variation of the axial velocity and (b) an electroosmotic flow rendered temporally and axially variable by the adsorbed species concentration on the wall. The predictions from asymptotic theory are tested against numerical results obtained from the full three-dimensional solution of the governing equations.

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