

Abstract Submitted  
for the DFD17 Meeting of  
The American Physical Society

**Diffusiophoresis in one-dimensional solute gradients** JESSE AULT, Oak Ridge National Laboratory, PATRICK WARREN, Unilever Research and Development, SANGWOO SHIN, University of Hawaii at Manoa, HOWARD STONE, Princeton University — We solve for the diffusiophoretic motion of suspended colloidal particles that are exposed to 1D solute gradients using numerical and analytical techniques. Similarity solutions are developed that govern the particle dynamics in a semi-infinite domain. The method of characteristics is also used to describe a diffusion-free transport model for the particles. In the limit of small particle diffusiophoretic mobility, relative to the solute diffusivity, analytical solutions are determined for the particle motions in both finite and semi-infinite domains. Results demonstrate the presence of local maxima and minima in the particle concentrations and confirm the traveling particle front dynamics. Results can inform the design of particle injection and withdrawal applications in pores and other quasi-1D geometries.

Jesse Ault  
Oak Ridge National Laboratory

Date submitted: 01 Aug 2017

Electronic form version 1.4