

Numerical studies on the instability of electroosmotic flow under concentration gradient

신상민, 강인석*, 조윤경¹, 임근배¹
포항공과대학교; ¹삼성종합기술원
(iskang@vision.postech.ac.kr*)

The instability of electroosmotic flow occurs when two inlet streams with different concentrations meet in a converged T-channel. It is a quite complex phenomenon which includes several underlying physical principles. In this work, we want to investigate the feasible reasons about instability of electroosmotic flow by numerical simulation. As a preliminary step, the different values of zeta-potential were obtained depending on the concentration of each solution. Therefore, velocity varies principally in a converged channel and the shear flow can be induced. The shear force at the interface of adjacent streams was calculated, because the development of the instability is sensitive to the details of the velocity profile. The measured values of zeta-potential are implemented to the boundary conditions and the velocity profiles are also considered along the downstream of T-channel. Compared with Kelvin-Helmholtz instability, the physical mechanism of electroosmotic flow instability can be sketched.