Effect of Ionic Strength on Retention Behavior of Polystyrene Latex Beads in Field-Flow Fractionation: Effective Boundary Slip Model Approach

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Abstract**:** *No-slip boundary condition (BC) model has been applied with a great success to model much macroscopic fluid flow experiments which would be insensitive to partial-slip BC. When we applied Field-Flow Fractionation (FFF) experiments, the No-slip BC model have some limitations. No-slip BC model cannot account for the characteristic flow properties with sufficient accuracy, particularly for systems with channel walls having weak interaction with the carrier fluid and particles.*

Compared to the standard retention theory (SRT) and experiment, the most crucial limitation is perhaps due to the wall effect attributed to the interactions existing between the particles and the channel wall. For example, an introduction of appropriate additives (salts, pH controller, surfactants) into standard particle systems and carrier composition is one of the most frequently practiced prescriptions to control the retention or elution behavior of the particles in most FFF operations.

In this study, we investigated the effects of ionic strength on the retention behavior of polystyrene (PS) latex beads in FFF channels including flow FFF (FlFFF) and sedimentation FFF (SdFFF). It was observed that, as the ionic strength increases, the retention and thus measured diameter of the PS latex beads tended to increase. Results obtained in this study are used for modelling of the slip boundary condition in FFF.

Keywords: *Slip boundary, Polystyrene latex bead, FFF, AF4, SdFFF*