Modeling Two Phase Fluid Flow in High Speed Counter Current Chromatography

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Abstract

High-speed counter current chromatography (HSCCC) is a unique process presenting possibilities for efficient separations by creating a large interfacial area between two phases in counter current flow. Millifluidic channels rotate about both planetary and solar axes to create a rapidly changing gravitational field and unique flow patterns. This research seeks to further our understanding of the fluid dynamics of HSCCC through numerical simulations. A model in the COMSOL Multiphysics® software has been developed to study the behavior of the dynamic interface between two immiscible fluids. A level set model creates a dynamic acceleration field. Model sensitivities are explored to provide insights into the governing processes of HSCCC. Additionally, effects of assumptions made during model initialization are discussed.