Characterization of Hydrodynamic Focusing Behavior in a Flow Cytometer

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ABSTRACT

Hydrodynamic focusing behavior is studied for two fluids coflowing at different veloc -ities inside a flow cytometer.In this work,a three-dimensional two-fluid model has b -een established to describe the flow transport behavior and coupling effects of the s -ample and water sheath streams.Adopting the Eulerian system,both sample and sheath fl -uids are treated as continuous media.The theoretical model comprises two groups of tr -ansient conservation equations of mass and momentum with inclusion of the interfacial momentum exchange between two fluids.The governing equations are solver numerically w -ith an iterative SIMPLEC algorithm to determine the flow properties. As the ratio of s -heath velocity to sample velocity is varied from 2.5 to 70,both predicted focusing wi -dth and length agree reasonably well with the Lee`sexperimental data.In addition, the present study examines the pressure drop across a cytometer as well as the focusing ti -me necessitated for completing one hydrodynamic focusing event in detail.

Keywords : Two-fluid Model,Hydrodynamic focusing, Flow Cytometer

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