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CFD-DEM simulations of particulate fouling in microchannels

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Abstract

One of the critical issues encountered when particle suspensions are made to flow in microfluidic devices is the adhesion of the suspended particles on the channel surfaces. This process, known as fouling, may lead to a progressive growth of clusters attached to the walls and, possibly, to a complete clogging of the microchannel.

In this work, we employ Computational Fluid Dynamics combined with Discrete Element Method to study the initial growth of a cluster at the wall of a slit microchannel. We consider a suspension of 'soft' microparticles in a Newtonian liquid under laminar flow conditions, with a well-known simple model to describe particle-particle adhesion.

The cluster growth dynamics is quantified in terms of morphology and projected area onto the slit wall. A comparison with some experimental data is

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