Fast Simulation of Suspension Dynamics in Presence of Particle-Clusters Inside Partially Blocked Channels

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System: Pressure-driven flow transporting suspended particles inside narrow cylinder partially blocked by depositions

Objectives: 1) Channel resistivity with deposited particles, 2) Suspension rheology, 3) Flow dynamics in particulate medium

Analysis: Basis function expansion of velocity field in regular and singular fields $\mathbf{v} = \mathbf{v}_R + \mathbf{v}_S$

$$\downarrow$$

Pressure loss ΔP, Effective viscosity η_{eff}, Motion of suspended bodies, Force and torque on deposition

Representative key results:

Pressure-drop due to fixed sphere

Effective viscosity vs. size-ratio