

Interplay between cake layer formation and flow behavior near a membrane surface

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In this study, a novel simulation algorithm is developed to understand the complex interplay between a cake layer of deposited particles and the surrounding flow behavior in a cost-effective way. Microscopic events of particle deposition onto the membrane surface could be explored by the aid of recent progress in direct visualization techniques. Hydrodynamic behavior of suspended particles in the vicinity of the membrane surface has been identified to possess a variety of interesting particle motions, such as tumbling motion, resuspension, and flowing cake layer. Although it is crucial to understand the inter-connection between particle deposition phenomena and the flow behavior, however, it has been almost neglected in previous studies. Based on Brownian Dynamics simulation, we tried to consider the influence of the cake layer on the flow by changing the boundaries of the flow domain. Formation and growth of cake layer are successfully reproduced in our simulation. When a cake layer is formed onto a membrane surface, the streamline is altered to pass over the cake layer which makes a particle drifted away from the membrane surface.