Influence of the vortex flow on particle transport and deposition in the patterned membrane channel

정선엽, 강태곤[1], 안경현†
서울대학교; [1]한국항공대학교
(ahnnet@snu.ac.kr†)

Particle transport and deposition onto the patterned membrane surface with the presence of the vortex flow are studied with a numerical simulation and experiment. A patterned membrane on which sub-micron to sub-millimeter surface patterns engraved has been reported to alleviate membrane fouling. In previous studies, flow characteristics near the patterned membrane surface are thought to be related with the reduced membrane fouling. However, the interplay between suspended matters and vortex flow has been less understood and still ambiguous. In this study, a particle dynamics simulation is developed to reproduce particle transport and deposition on the patterned membrane surface and the results were verified by experiments. Vortex flow is formed in the valley region of the patterned membrane surface and the behaviors of the suspended particles were affected by the vortex flow. The residence time of the particles is increased in the vortex region, while the cake layer of the deposited particles is readily destabilized by the vortex flow. Also, the entrance of particles into the vortex region is hindered with the shear gradient.