

마이크로채널 유동에서 와도가 혼합에 미치는 영향 유기수[†] · 송시문^{*}(한양대)

Effects of vorticity on mixing in a microchannel flow

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Keywords: Y-Shape microchannel(Y-형 마이크로채널), Mixing(혼합), Vortex Index(와도지수), Transverse Diffusion(횡방향 확산)

Abstract : We numerically investigate effects of vorticity on mixing in microchannels. Mixing of two fluids in a Y-shape microchannel is studied using vortex index, mixing index and degree of transverse diffusion. The studies are performed for three geometries: Y-channel, Y-channel with a post array along the centerline, and Y-channel with a zig-zag post array. The results indicate that the high vorticity does not always ensure high performance of mixing in a microchannel. The vorticity of centerline post array and zig-zag post array is about the same, but the zig-zag post array shows significantly better mixing performance than the other.

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The Study of Mixing Enhancement by Rotating and Oscillating Stirrers in the Micro Channel

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Key Words: Active mixer(능동형 혼합기), Micro mixer(미소 혼합기), Lattice Boltzmann Method(격자볼츠만법), Oscillating stirrer(진동 교반기), Rotating stirrer(회전 교반기)

Abstract : The mixing effect is studied by comparing rotating and oscillating stirrers in the micro channel. The cases of $Re = 10$ and $Re = 80$ with various stirring speeds are considered in Schmidt number 10. In $Re = 10$, the oscillating stirrer represents better mixing rate than the rotating stirrer up to the critical stirrer speed. In $Re = 80$, the results of oscillating and rotating stirrer show that the faster the stirrer speed, the higher the mixing effect, and the oscillating stirrer keeps the higher mixing rate. The D2Q9 Lattice Boltzmann Method is used due to the merits for unsteady flow and adjusting moving boundary condition.