

Weak Inertia and Mixing Between Rough Surfaces

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Weak inertial effects in flows between two rough surfaces may lead to significant effects in various situations such as fracture flow or micro-fluidic. Recent experimental results have shown that proper surface patterning could produce vortex which are transverse to the longitudinal mean flow and could be used to produce chaotic stirring. The present study concerns the influence of weak-inertia effects produced by a smooth surface patterning on the flow field and the stream-line geometries. We describe an asymptotic treatment of the Navier–Stokes equation that leads to equations describing the inertial corrections to lubrication equations. These equations are solved with a high order spectral method and the results discussed with examples relevant for mixing describing the inertial influence on the flow field properties.

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