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Short Communication

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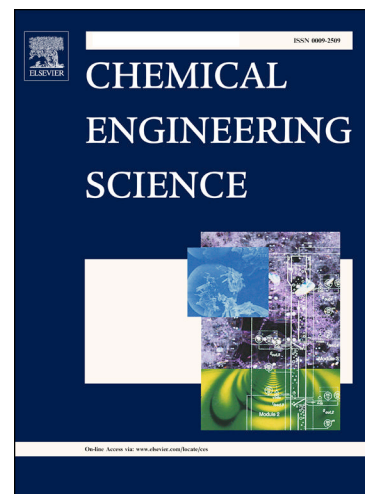
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Flow past a rotating sphere in a non-Newtonian, power-law fluid, up to a Reynolds number of 10000

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Abstract

The flow induced by a sphere rotating inside an incompressible, non-Newtonian, power law fluid has been investigated numerically. The rotating sphere is enclosed in a concentric cubic box with solid boundaries. The fluid power-law index varied between 0.2 and 2 thereby covering both shear-thinning and shear-thickening fluids and the Reynolds number varied between 0.01 and 10000. Numerical predictions show significant differences between shear-thinning and shear-thickening fluids. In the first case the flow is confined near the sphere whereas in the second case the flow extends up to the box plates. In creeping flow and shear-thinning fluids the torque is independent of the Reynolds number.

Keywords: rotating sphere, non-Newtonian fluid, power-law, torque

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