

Inertia effects on the fluid flow through a corrugated domain

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We consider an incompressible viscous fluid flowing through a domain with rough wall. Motivated by the applications, we assume the periodicity of the roughness in the longitudinal direction and that the flow is governed by the prescribed pressure drop. The aim is to investigate the effects of inertia and corrugated boundary on the fluid flow. Employing the average boundary roughness as the small parameter, we use boundary-layer analysis to derive a higher-order asymptotic approximation of the flow. As a result of our analysis, we propose the new formula for the Darcy-Weisbach friction coefficient.

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