Malevich, A. E.; Mityushev, V. V.; Adler, P. M.

Stokes flow through a channel with wavy walls.  (English) Zbl 1092.76017

Summary: Stokes flow is solved through a channel with three-dimensional wavy walls enclosed by two wavy walls whose amplitude is proportional to the mean clearance of the channel multiplied by a small dimensionless parameter \( \varepsilon \). The application of an analytical-numerical algorithm yields efficient formulas for velocities and permeability. These formulas include \( \varepsilon \) in symbolic form. When \( \varepsilon \) increases, the Poiseuille flow (\( \varepsilon = 0 \)) is disturbed and eddies can arise above a critical value \( \varepsilon = \varepsilon_c \). These results are also successfully compared to a fully numerical solution.

MSC:

76D07 Stokes and related (Oseen, etc.) flows
76M45 Asymptotic methods, singular perturbations applied to problems in fluid mechanics

Keywords:

small parameter; analytical-numerical algorithm; Poiseuille flow

Full Text: DOI

References:


This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.