Viscous flow through straight pore channels

Kacimov A., Kayumov I.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Steady laminar viscous 2-D flow through straight cylindrical tubes is studied. By comparison of the film-type Averyanov flow in an annular domain and the common Poiseuille flow in a circular tube, it is deduced why at high suctions sands are less conductive than clays. Flows in noncircular tubes with cusps modeling contact zones of solid particles are considered. Using conformal mappings, the Poisson equation in the physical plane is reduced to the Laplace equation in an auxiliary disk. The Dirichlet problem in this disk is solved by the Poisson integral formula. The value of maximal velocity at the center of the tube and the total flow rate (conductivity) are calculated. Copyright © 2002 by Begell House, Inc.