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Flow of gases in isothermal prismatic channels at arbitrary Knudsen-numbers ANDREAS G. CLASS, Forschungszentrum Karlsruhe, Germany, GOTTFRIED CLASS — In rarefied gas flow in ducts of prismatic cross section a minimum of the flow resistance, which was first noted in 1909, is observed for Knudsen Numbers ranging from 1 to 10. We propose a closed correlation for the flow resistance and determine all the parameters from physical considerations. The relation is applicable to arbitrary Knudsen numbers and ducts of arbitrary length. Employing recent experimental data from the literature the correlation is verified for a wide range of parameters. The present study provides a phenomenological explanation of the Knudsen-minimum and can be used to extend results obtained for round channels to other prismatic cross sections. The proposed correlation allows for improved computations of channel flow in vacuum technology applications.

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