

Abstract Submitted
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Plane Poiseuille Flow of a Rarefied Gas in the Presence of a Strong Gravitation TOSHIYUKI DOI, Tottori University — Poiseuille flow of a rarefied gas between two horizontal planes in the presence of a strong gravitation is considered, where the gravity is so strong that the path of a molecule is curved considerably as it ascends or descends the distance of the planes. The gas behavior is studied based on the Boltzmann equation. An asymptotic analysis for a slow variation in the longitudinal direction is carried out and the problem is reduced to a spatially one dimensional problem, as was in the Poiseuille flow problem in the absence of the gravitation. The mass flow rate as well as the macroscopic variables is obtained for a wide range of the mean free path of the gas and the gravity. A numerical analysis of a two dimensional problem is also carried out and the result of the asymptotic analysis is verified.

Toshiyuki Doi
Tottori University

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