

Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Effect of weak gravitation on the plane Poiseuille flow of a highly rarefied gas TOSHIYUKI DOI, Tottori University — Plane Poiseuille flow of a highly rarefied gas that flows horizontally in the presence of weak gravitation is studied based on the Boltzmann equation for a hard sphere molecular gas. The behavior of the solution in the regime of large mean free path and small strength of gravity is studied numerically based on the one-dimensional Boltzmann equation derived by means of an asymptotic analysis for a slow variation in the flow direction. It is clarified that the effect of weak gravity on the flow is not negligible when the mean free path is so large that it is comparable to the maximum range of the parabolic molecular path within the channel. When the mean free path is much larger than this range, the effect of gravity that makes the molecules fall plays the dominant role in determining the distribution function, and thus the over-concentration in the distribution function as well as the flow velocity does not grow further even if the mean free path is increased.

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Date submitted: 05 Aug 2011

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