

зации от силы взаимодействия, что показывает необходимость изучения такого эффекта в связке с видом взаимодействия.

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OSCILLATORY HEATING IN A MICROCHANNEL AT ARBITRARY OSCILLATION FREQUENCY IN THE WHOLE RANGE OF THE KNUDSEN NUMBER

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Recent interest in investigating unsteady heating processes in rarefied gases is motivated by their applications in several fields including micro-electromechanical systems, microelectronics and laser industry. Time dependent heat transfer configurations are common in gaseous micro devices and may be produced by time dependent boundary cooling or/and heating.

A transient flow of a gas caused by a sudden change in the boundary temperature, which is the counterpart of the periodic time-dependent problem, is a type of basic problem of a rarefied gas flow [1]. Recently in [2] the transient heat transfer in a gas confined in a small-scale slab due to the instantaneous change of a wall temperature has been investigated. In this work semi-analytical approaches have been applied in the free molecular and hydrodynamic limits, while the DSMC method has been used in the transition regime. The oscillatory heating in a microchannel has been recently investigated by the low-variance deviational simulation Monte Carlo method motion for an arbitrary time variation of the boundary temperature [3–4]. Periodic time-dependent behavior of a rarefied gas between two parallel planes caused by an oscillatory heating of one plane has been numerically studied based on the linearized Boltzmann equation for a hard-sphere molecular gas [5].

In the present study, an analysis of the oscillatory heating of a rarefied gas confined between two parallel plates is based on linear kinetic theory. The implementation of a kinetic solution provides reliable results in the whole range of the Knudsen number with modest computational effort. In particular, the time dependent heat transfer is modelled by the linearized nonstationary kinetic equation, subject to Maxwell purely diffuse boundary conditions. The Shakhov model of the Boltzmann equation is chosen as the most appropriate one because it provides the correct Prandtl

number so that both viscosity and thermal conductivity are taken into account in the solution of the kinetic equation. The solution of the problem is determined by two parameters: the Knudsen number and the ratio of the intermolecular collision frequency over the oscillation frequency. It is assumed that the oscillation is fully established and the dependence of the solution on the time is harmonic, while its dependence on the spatial coordinate will be obtained numerically.

The numerical solution of the problem is fully deterministic and based on finite differencing scheme in the physical space and in the discrete velocity method in the molecular velocity space. The aim of the present work is to calculate the heat flow induced by oscillatory heating of one of the parallel plates over a wide range of both parameters. Results will be presented for the amplitude and the phase of all macroscopic quantities of physical interest.

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РАЗВИТИЕ СИСТЕМЫ ОБНАРУЖЕНИЯ ЗНАНИЙ LING С ЦЕЛЮ ПОВЫШЕНИЯ КАЧЕСТВА ВИЗУАЛИЗАЦИИ ОНТОЛОГИИ

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На данный момент в РФ имеются онтолингвистические системы обнаружения знаний [1]. LING (Екатеринбург, УрФУ) [2] и InDoc (Томск) обладают хорошими возможностями по созданию онтологий с текстовым контентом и обслуживанию естественно-языковых запросов с использованием онтологий. Обе системы можно рассматривать как реализации рамочного технологического проекта В.И. Бодякина. Следует отметить, что в системе LING на корпоративном уровне реализован визуализатор онтологий не являющийся интерфейсно-дружественным. Поставлена задача обзора технологий визуализации и развитие технологии, реализованной в LING, для обеспечения совместимости с выбранным визуализатором. Были рассмотрены аналоги технологий визуализации и сопоставлены по следующим критериям возможности отображения связей: иерархические, внутриуровневые, межуровневые (неиерархические). В качестве прототипа выбрана технология информационных ландшафтов. Ее критика – невозможность визуализации онтологии с пристройкой 3-х мерной арены.