Effect of inelastic collisions of polyatomic gas molecules on the Burnett slip coefficient

© A.B. Poddoskin

Bauman Moscow State Technical University, Moscow, 105005, Russia

The problem of gas Burnett sliding along a flat surface is solved under the proposed kinetic model for the polyatomic gas with molecule rotational degrees of freedom, with due regard for the rotational-translational transitions of the gas molecules. The Burnett slip coefficient is obtained as a function depending on the frequency of inelastic collisions of the gas molecules and the accommodation coefficient of tangential momentum.

Keywords: *Burnett slip, polyatomic gas, molecule rotational degrees of freedom.*

REFERENCES

[1] Sone Y., Aoki K. Forces of a spherical particle in a slightly rarefied gas. *Rarefied Gas Dynamics: Proc. 6th Intern. Symp.* N.Y., Acad. Press, 1977, vol. 51, part 1, 417 p.

[2] Poddoskin A.B., Yushkanov A.A., Yalamov Yu.I. *Doklady SSSR AN. MZhG – Reports of USSR AS. FM,* 1980, vol. 254, no. 2, p. 343.

[3] Yalamov Yu.I., Galoyan V.S. *Dinamika kapel v neodnorodnykh vyazkikh sredakh* [The Dynamics of Droplets in Inhomogeneous Viscous Media]. Yerevan, Luys Publ., 1985, 205 p.

[4] Zhdanov V.M., Alievskiy M.Ya. *Protsessy perenosa i relaksatsii v molekulyarnykh gazakh* [Processes of Transfer and Relaxation in Molecular Gases]. Moscow, Nauka Publ., 1989, 335 p.

[5] Poddoskin A.B., Yushkanov A.A. *Izvestiya RAN. MZhG – Proceedings of the RAS. FM,* 2000, no. 1, p. 163.

[6] Poddoskin A.B. *Teplofizika vysokikh temperatur – High Temperature,* 2004, vol. 42, no. 5, p. 796.

[7] Poddoskin A.B. *Inzhenernyi zhurnal: nauka i innovatsii — Engineering Journal: Science and Innovations,* 2014, no. 1. Available at: http://engjournal.ru/catalog/fundamentals/physics/1189.html.

[8] Mason E.A., Monchick L. Heat Conductivity of Polyatomic and Polar Gases. *J. Chem. Phys*. 1962, vol. 36, p. 1622.

[9] Monchick L., Pereira A.N.G., Mason E.A. Heat Conductivity of Polyatomic and Polar Gases and Gas Mixtures. *J. Chem. Phys*., 1965, vol. 42, p. 3241.

[10] Barantsev R.G. *Vzaimodeystvie razrezhennykh gazov s obtekaemymi poverkhnostyami* [Interaction of Rarefied Gases with Streamlined Surfaces]. Moscow, Nauka Publ.,1975, 343 p.

[11] Sandler S.I. Thermal Conductivity of Polyatomic Gases. *Phys. Fluids*., 1968, vol. ll, p. 2549.

Poddoskin A.B. graduated from Krupskaya Moscow Regional Pedagogical Institute (Faculty of Physics) in 1972**.** Dr. Sci. (Phys.-Math.), professor at the Department of Physics at the Bauman Moscow State Technical University. The author of more than 100 researches in the field of kinetic theory of gas and dynamics of aerosols.
e-mail: apoddoskin@yandex.ru.