A calculation approach for pumping performance of a kinetic high vacuum pump

© K.E. Demikhov, A.M. Makarov, N.K. Nikulin, E.V. Svichkar

Bauman Moscow State Technical University, Moscow, 105005, Russia

The paper presents an approach for calculation of a kinetic high vacuum pump pumping performance for molecular mode of a gas flow. The calculation is based on the general assumption for gas molecular-kinetic theory: thermal motion velocity molecular distribution is described by Maxwellian distribution, gas molecules interaction is absent, the interaction of a solid body surface and gas molecules is described in terms of the diffuse reflection law, the accommodation coefficient equals unity.
Direct statistical modeling for calculations of flow parts pumping features and analytic dependence connecting their joint operation enabled sufficiently to reduce calculation time with no decrease in calculation accuracy and with no distortion of pumping physics. The suggested mathematical relations allow to calculate present kinetic high vacuum pumps (turbomolecular, molecular and combined turbomolecular with molecular stages) considering the effect of a suction branch and overflows in pump flow parts.

Keywords: *molecular pump, turbomolecular pump, kinetic pump, statistical modeling, probability, conductivity, response, pressure, molecule*

Demikhov K.E., Dr. Sci. (Eng.), Professor, Head of the Vacuum and compressor equipment Department of Bauman Moscow State Technical University, Scientist of the Russian Federation. Author of more than 170 publications. e-mail: nkn@bmstu.ru

Makarov A.M., Dr. Sci. (Eng.), Professor of the Physics Department of Bauman Moscow State Technical University. Author of 200 scientific papers.

Nikulin N.K. (b.1946) graduated from Bauman Moscow Higher Technical School in 1970. Ph.D., Assoc. Professor of the Vacuum and compressor equipment Department of Bauman Moscow State Technical University. Working in the field of vacuum technology more than 32 years, author of over 100 scientific proceedings.

Svichkar E.V. graduated from Bauman Moscow State Technical University in 2005. Assoc. Professor the Vacuum and Compressor Equipment Department of Bauman Moscow State Technical University.Baumann. Working in the field of vacuum technology 8 years, it has published 15 scientific papers.