Conductivity testing in molecular and transient mode of a gas flow by particle-in-cell method

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To describe the spatially non-uniform gas flow in the transient mode a mathematical model based on the statistical method of particles in cells and an algorithm to calculate the rarefied gas parameters in the vacuum system have been developed. This paper presents a scheme for calculating the vacuum systems conductivity in the molecular and transient flow modes for the special case of an isothermal gas flow in a thin capillary without sorption phenomena on its walls. There are main assumptions of the model: an ideal monatomic gas is considered, the collision of the molecules is referred as elastic collision of hard spheres, only binary collisions are considered; gas molecules move randomly, the time of collision tends to zero, the distribution of molecules velocities is determined by Maxwell law, at the interaction of gas molecules with the wall an accommodation coefficient is unity. The data obtained as a result of the numerical experiment are compared with calculations based on Knudsen empirical relationships.

Keywords: *vacuum, transient mode, flow, rarefied gas, mathematical model, conductivity, statistical methods, method of particles in cells, algorithm.*

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