NUMERICAL MODEL OF VISCOSITY IMPACT ON FLOW IN LOW-THRUST ROCKET ENGINE NOZZLES IN THE APPROXIMATION OF A LAMINAR BOUNDARY LAYER WITH VELOCITY SLIP

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The paper describes a numerical model of viscosity impact on flow in low-thrust rocket engine nozzles developed at the research centre of space power of Samara State Aerospace University. The accepted assumptions of the physical model used are outlined. The mathematical model is described in the form of equations in partial derivatives which express the laws of conservation of mass, momentum and energy as applied to the flow in the laminar boundary layer of low-thrust rocket engine nozzles with the negative longitudinal pressure gradient under boundary conditions of velocity slip and temperature jump on the nozzle wall. The developed algorithm of solving the equations of the mathematical model numerically is outlined, which provides the stability and the pre-set accuracy of calculation.

Laval nozzle, boundary layer, velocity slip, displacement thickness, momentum thickness, integral momentum equation, Fokner-skan equation, shape parameter, consumption ratio, friction losses.

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