TRUDY INSTITUTA MATEMATIKI I MEKHANIKI UrO RAN

Vol. 23 No. 2 **2017**

DOI: 10.21538/0134-4889-2017-23-2-200-209

MSC: 76F02, 76F45, 76M45, 76R05, 76U05

ON THE PROBLEM OF THE FLOW OF AN IDEAL GAS AROUND BODIES

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For Euler equations describing a steady motion of an ideal polytropic gas, we consider the problem of a flow around a body with known surface in the class of twice continuously differentiable functions. We use approaches of the geometric method developed by the authors. In the first part of the paper, the problem of a flow around a given body is solved in a special class of flows for which the continuity equation holds identically. We show that the class of solutions is nonempty and obtain one exact solution. In the second part of the paper we consider the general case of stationary flows of an ideal polytropic gas. The Euler equations are reduced to a system of ordinary differential equations, for which we obtain an exact solution for a given pressure on the body. Examples illustrating the properties of the obtained exact solutions are considered. It is shown that such solutions make it possible to find points of a smooth surface of a body where blowups or strong or weak discontinuities occur.

Keywords: Euler equations, polytropic gas, flow around bodies, stationary flows, exact solutions.

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The paper was received by the Editorial Office on June 16, 2016.

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Cite this article as:
L. I. Rubina, O. N. Ul'yanov, On the problem of the flow of an ideal gas around bodies, *Trudy Inst. Mat. Mekh. UrO RAN*, 2017, vol. 23, no. 2, pp. 200–209 .