

Exact invariant solutions of rank 1 of the gas dynamics equations admitting symmetry group with pressure translation

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Abstract: The gas dynamics equations with the state equation of a general form have the following symmetries: space translations, time translation, rotations, Galilean translations, uniform dilatation. In this investigation the state equation is a pressure equal to the sum of two functions - the first function depends on density, and the second function depends on entropy [1]. Such system of equations has additional symmetry – pressure translation. The system admits a 12-dimensional Lie algebra. An optimal system of dissimilar subalgebras of the 12-dimensional Lie algebra was constructed in [2]. Invariant submodels of rank 1 are calculated for 3-dimensional subalgebras [2]. The submodels are the systems of ordinary differential equations. Exact solutions were found for some submodels [3]. The motion of particles and volumes according to the exact solution is considered. The author was supported by the Russian Foundation for Basic Research (project no. 18-29-10071) and partially from the Federal Budget by the State Target (project no. 0246-2019-0052).

Keywords: gas dynamics equations; subalgebra; submodel; exact solution

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