Partial solution of a linearized system of equations of gas dynamics taking into account the action of the Coriolis force

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Due to the non-linearity of the system of gas dynamics equations, the construction of its solutions is quite time-consuming. This was the reason for the linearization of the system of gas dynamics equations on its exact solutions [1]. In this paper, if we do not take into account the action of gravity, we present a linear system of partial differential equations based on an exact solution. The influence of gravity is not taken into account when studying gas-dynamic flows in the bottom parts of natural ascending swirling flows, in which the gas parameters do not strongly depend on the height. A concrete solution for a linearized system in the form of a traveling wave propagating in different directions is constructed. The presence of several traveling wave propagation velocities for a system of gas dynamics equations is a rather unexpected fact. This happens only in the case of multicomponent media [2]. Obviously, this fact is due to the fact that the system of equations of gas dynamics takes into account the action of the Coriolis force.The obtained solution is modeled by the Runge-Kutta numerical method of the fourth order of accuracy.

[1] Bautin S P and Krutova I Y 2019 *Linearized system of equations of gas dynamics when taking into account the action of the Coriolis force: Preprint* (Snezhinsk: Siberian physical-technical Institute NRNU MEPhI)

[2] Bautin S P 2008 *Applied Mechanics and Technical Physics* **49** 35–44