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ЧИСЛЕННОЕ ИССЛЕДОВАНИЕ ВЛИЯНИЯ ПРОСТРАНСТВЕННОГО РАСПОЛОЖЕНИЯ ВЫСОКОСКОРОСТНОГО ТРАНСПОРТНОГО СРЕДСТВА ОТНОСИТЕЛЬНО ПУТЕВОЙ СТРУКТУРЫ НА АЭРОДИНАМИЧЕСКИЕ ХАРАКТЕРИСТИКИ

NUMERICAL STUDIES IN EFFECTS OF 3D LOCATION OF HIGH-SPEED VEHICLE RELATED TO TRACK STRUCTURE ON AERODYNAMIC CHARACTERISTICS

The flow around high-speed vehicle near the track structure was calculated using the three-dimensional Reynolds averaged Navier–Stokes equations. For the turbulence simulation the SST model was used. The finite volume method was used for the numerical solution of the system of original equations. The distributions of the pressure and the coefficient of friction as well as limiting surface streamlines on surfaces of the vehicle body are presented. The 3D flow structure is visualized. The system of two transverse and two longitudinal counter-rotating vortices is observed in the flow behind the body. The influence of the angle of setting and the distance to the track structure on aerodynamic characteristics of the high-speed vehicle is analyzed.

Keywords: vehicle, aerodynamics, Navier-Stokes equations, method of control volume, aerodynamic coefficients.

1. High-Speed Magnetic Vehicle with Electrodynamic Levitation (*in Russian*) / *V. A. Dzenzersky, V. I. Omelyanenko, S. V. Vasiliev, V. I. Matin, S. A. Sergeev*. – Kiev : Naukova Dumka, 2001. – 480 p.
2. Computational and wind tunnel experiment in high-speed ground vehicle aerodynamics / *O. A. Prykhodko, A. B. Sohatsky, O. B. Polevoy, A. V. Mendriy* // Proc.19th International Conference on Magnetically Levitated Systems and Linear Drives. – 2006. – N 118. – 10 pp.
3. *Minguez M. L.* High-order large-eddy simulation of flow over the “Ahmed body” car model / *M. L. Minguez, R. Pasquetti, E. Serre* // Physics of fluids. – 2008. – V. 20, 095101. – 17 pp.
4. *Prikhodko A. A.* Computer Technologies for Aerohydromechanics and Heat-Mass Exchange (*in Russian*) / *A. A. Prikhodko*. – Kiev : Naukova Dumka, 2003. – 380 p.
5. *Menter F. R.* Two-equation eddy-viscosity turbulence models for engineering applications / *F. R. Menter* // AIAA Journal. – 1994. – V. 32(8). – P. 1598 – 1605.