MODELLING OF STRUCTURE OF TURBULENCE IN THE ROTATING CYLINDER AT INFLUENCE OF THE RADIAL MAGNETIC FIELD

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The successes of modern science and technology have aroused great interest in the use of the phenomena described by the magnetic hydrodynamics of the flow of a conducting fluid in the presence of electromagnetic fields. Already mastered or are being developed technical applications of magneto hydrodynamics include electric power generation, plasma confinement for controlled thermo nuclear reactions, as well as flight control of hypersonic missiles and aircraft. MHD is an important tool in the devices to improve the physical properties of electrically conducting fluid under the influence of the magnetic field. In addition, the study of these phenomena leads to a better understanding of the problems in the physics of gases and the structure of cosmic bodies [1].

We consider the steady turbulent helical fluid flow in a circular cylindrical tube rotating about its axis under the influence of the radial magnetic field at the center of the cylinder. It is proposed semi-empirical model constructed on the basis of equations for the one-point second-order moments for velocity, for the closure of the Reynolds equation for shear flows. Effect of magnetic field on turbulence is an interesting phenomenon. Imposing a magnetic field outside only on a certain part, it is possible to influence the structure of turbulence, fundamental opportunity to receive the flow of the contrast between the steady laminar flow and chaotic flow at high Reynolds numbers. Being unstable in the absence of such flows in a strong magnetic field can be sustained, and the critical Re_{kp} Reynolds number - with the field will grow [2].

The constructed model allows us to obtain closed equations for the motion characteristics of the medium and approximately calculate the fluctuating characteristics of the flow of a conducting fluid rotating in a radial magnetic field. The three-dimensional problem is solved numerically the equations of motion are solved for the modified method of fractional steps with the use of compact schemes, the equation for pressure is solved by the Fourier method, in combination with a matrix factorization. The components of the magnetic field are using the sweep method at each stage of fractional steps. Built and designed a parallel algorithm for solving this problem is implemented on a multiprocessor system with distributed memory [3]. The results are compared with the calculated and experimental data of other authors.

Thus, the results of this work can be widely used in mathematical modeling of MHD flows, in particular, the developed model allows to study the effect of MHD – effects on the hydrodynamic processes of various metallurgical equipment.

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METHOD OF LARGE EDDY SIMMUATION FOR RESEARCH OF INHOMOGENEOUS TURBULENT FLOWS

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Turbulence remains one of the most complex objects to study of fluid mechanics and gas. In the almost century-long history of study offered dozens of different approaches that reflect the most actively developed

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