

THE APPEARANCE OF AN UPWARD SWIRLING GAS FLOW IN THE MODEL ON A SPARSE GRID

S. N. Kononov^{1, 2}, E. S. Levunina^{1, 3}

¹MEPhI, Snezhinsk, Russia

²SUSU, Ozersk, Russia

³FSUE «PO «Mayak», Ozersk, Russia

In [1], a number of tasks were set for a compressible viscous heat-conducting gas. The complete system of Navier-Stokes equations in cylindrical coordinates is presented in a dimensionless form and takes into account the action of the gravity field and the Coriolis force. The initial condition is an uneven state of rest. Non-stationary modes are defined by boundary conditions. The first task simulates the movement of air in the presence of a spot of heating by the sun's rays on the earth's surface and is defined by the area of elevated temperature around the axis of the lower face of the cylinder. The second task simulates the behavior of the gas when an upward purge occurs.

The tasks were solved using numerical methods using an explicit scheme. The circuit was checked at rest, and later this circuit was used to calculate non-stationary modes.

The solution of the above tasks required optimization of the calculation scheme [2] and allowed us to check the initial gas flows of physical phenomena observed in natural conditions.

The simulation time was increased due to the rarefaction of the computational grid near the axis, which made it possible to observe the occurrence of ascending swirling flows according to [1]. The results of the numerical experiment can be used in the future to model problems with ascending swirling flows.

References

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