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ON THE ASYMPTOTIC METHOD OF SOLUTION OF ONE CLASS OF NONLINEAR PROBLEMS OF MATHEMATICAL PHYSICS

This work proposes an asymptotic method of solution for a system of nonlinear nonhomogeneous equations of one class of mixed problems with an unknown external boundary in the domain. The system of equations describes an adiabatic spherical and symmetrical motion of a gravitating gas, while a moving detonation wave (a spherical surface, where the solution undergoes the first kind discontinuity) is the external boundary of the domain.

In particular, the nonautomodel problem of a central explosion followed by a thermonuclear detonation of a nonhomogeneous, bounded with vacuum, gas sphere which is balanced in its own gravitating field, is discussed as the test problem.

The asymptotic method of a thin shock layer is used for the solution of the mixed problem for a system of nonlinear nonhomogeneous equations. Analytical formulas of the first two approximations for the motion law and the thermodynamic characteristics of the medium are calculated. For the zero approximation of the detonating wave motion layer the Cauchy problem is solved exactly in particular case and numerically in the general case. Interpolation formulas and the corresponding asymptotics are found.