



# Methods for the Localization of Singularities in Numerical Solutions of Gas Dynamics Problems (Scientific Computation)

*E.V. Vorozhtsov, N.N. Yanenko*

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As a result of the numerical simulation of multidimensional gas dynamics problems on a computer, the output information is obtained in the form of immense arrays of numerical data. In this connection, there arises the problem of extracting the actually needed information from these arrays; in other words, it is necessary to solve the problem of information compression. In particular, the numerical solution of gas dynamics problems often aims at the information on the solution singularities—the shock waves, contact interfaces, slip lines, etc. Our book is devoted to the development and investigation of accuracy of the algorithms for the localization of such singularities. In addition, the questions of development of the algorithms for the classification of singularities into several types (on the basis of shock-capturing numerical solutions of two-dimensional gas dynamics problems) are considered for the first time in the monographic literature. For this purpose, some ideas and methods of the modern theory of digital-image processing and of the pattern recognition theory are used. The information obtained at the output of the systems of the singularities classification presented in this book is rich in content, because it contains both physical and geometrical characteristics of recognized objects. Therefore, such "intellectual" systems of information extraction may be used in the expert systems of automated design of aero dynamic bodies which meet some optimality requirements. This is, in our opinion, very attractive from the point of view of applications.

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