STATIONARY CONFIGURATIONS WITH DETONATION WAVES IN SUPERSONIC FLOWS*

A. V. Trotsyuk[1]

Abstract: The results of a systematic study of the structures and flow regimes with an oblique detonation wave (ODW) in supersonic reacting flow have been presented. The main task is to clarify the conditions for the stationarity of the forming shock wave – detonation structures. The paper presents the main results of numerical studies of two-dimensional (2D) supersonic flows with ODW formed by compression bodies in the form of: (i) a flat wedge; (ii) a "wedge-flat body" combination; (iii) a wedge above a solid surface; and (iv) in the form of a single-pass solid spiral in the gap between the walls of two coaxial cylinders (2D approximation). For all the considered reacting mixtures and variants of the compression body, the phenomenon of a double solution (bifurcation of a stationary solution with respect to the starting conditions for the detonation chamber operation) was found, i. e., after completion of the transition process, the final stationary shock–detonation structure depends on the initial state of the flow in computational domain at the initial moment $t = 0$.

Keywords: supersonic flow; detonation wave; detonation kinetics; double solution

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[1]M. A. Lavrentyev Institute of Hydrodynamics of the Siberian Branch of the Russian Academy of Science, 15 Lavrentyev Ave., Novosibirsk 630090, Russian Federation; trotsyuk@hydro.nsc.ru

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Contributor

Trotsyuk Anatoliy V. (b. 1959) — Candidate of Science in physics and mathematics, senior research scientist, head of laboratory, M. A. Lavrentyev Institute of Hydrodynamics of the Siberian Branch of the Russian Academy of Science, 15 Lavrentyev Ave., Novosibirsk 630090, Russian Federation; trotsyuk@hydro.nsc.ru