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Hysteresis-Related Phenomena in Shock Wave Reflection

Mikhail Ivanov, Dmitry Khotyanovsky, Alexey Kudryavtsev, Stanislav Nikifirov, Anatoly Trotsyuk

Institute of Theoretical and Applied Mechanics, Novosibirsk, Russia

Our presentation is focused on recent advancements in investigations of shock wave reflection. The hysteresis in the transtion between steady regular and Mach reflections, which was observed in 1995 in numerical simulations and wind-tunnel experiments, aroused a renewed interest in this old problem. We consider various aspects of hysteresis-related shock reflection phenomena including 1) experimental demonstration of the hysteresis in a low-noise wind tunnel where flow disturbances are minimum; 2) numerical simulations of the transition induced by artificial disturbances, especially by blast waves caused by laser energy deposition; 3) existence of shock-wave configurations with a reflected shock wave of a strong family upon asymmetric shock wave interaction; 4) Mach reflections in a chemically reacting gas mixture with a standing detonation wave as a Mach stem; 5) hysteresis in the transition between regular and Mach reflections of steady bore waves on shallow water. The universal character of the hysteresis in flow discontinuity interactions in different physical systems is emphasized.

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