

SHOCK WAVE AND SHOCK WAVE RESEARCH AT INDIAN INSTITUTE OF SCIENCE

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There has been global resurgence in hypersonics and related areas in recent times. India has joined these efforts with its own ambitious programmes, such as, human in space program, landing of man on moon, mars exploration mission and development of hypersonic technology demonstrator vehicle. Keeping these developments in view The *High Enthalpy Aerodynamics Research* group initiated research activities in the areas of hypersonics, scramjets and shock waves about a decade ago and built most advanced high speed test and diagnostic facilities and successfully established very active research group addressing all the relevant areas of research. These facilities include a series of hypersonic shock tunnels HST2, HST3 (free piston driven shock tunnel), HST4 and HST5 (combustion driven shock tunnel), a couple of shock tubes CST1 and CST2 for high temperature chemical kinetics studies and about a dozen shock tubes for various scientific and industrial applications. The flow diagnostic facilities include high speed schlieren system with a camera capable of taking 0.2 million fps, home grown electrical discharge technique, digital holography and interferometry and other spectroscopic techniques for flowfield measurement. Our major research thrust is in the areas of hypersonic flow control using various techniques, chemical kinetics at high temperatures and pressures, development of high temperature materials for space applications, intake studies for scramjet engines, biological, agricultural and industrial applications of shock waves. Our research on aerospikes, energy deposition into the freestream, heat addition into the shock layer by exothermic reaction of chromium atoms and magnetohydrodynamics has demonstrated aerodynamic drag reduction capabilities of these techniques for hypersonic flight vehicles. An overview of the experimental facilities with their capabilities and some typical important research results of recent studies will be presented in this talk.