Comparison of the energy impact on the supersonic flow around a semicylindrical body by gases with different heat capacity ratio

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The work relates to the problem of controlling supersonic flows and studys the possibility of influencing shock-wave configurations by non-mechanical methods. The possibility of controlling a supersonic flow around a body when organizing an energy impact in the region between the detached shock wave and the body is studied. Electrogasdynamic (EGD) impact is used by organizing a gas discharge around the leading edge of the body. The purpose of the work is to show the possibility of a local impact on the position of the bow shock wave and to compare the effectiveness of this impact when gases flow around a gas-dynamic body with different heat capacity ratio. The energy contribution and gas heating is carried out in a narrow near-surface region, which leads both to gas heating in this region and to flow ionization followed by shift of the shock wave from model. The main objective of this work is to compare how the position of the bow shock wave changes in a supersonic xenon and air flow around a body with an increase in the thermal parameter of the EGD action, namely the ratio of the Joule heat received by the gas in the discharge to the doubled kinetic energy of the flow per unit volume, assuming that during the time of flow around the discharge by the time of the study (about 300 s), all the energy received in the discharge by electrons, transferred to the gas. The thermal parameter is changed by increasing the intensity of the surface gas discharge. The experiments were carried out in a supersonic nozzle, where a semi-cylindrical body was placed with built-in electrodes, which were connected with external power supply. The flow patterns were recorded by a multi-frame Schlieren system.