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PLASMA STANDS OF THE P-2000 FACILITY AND THEIR POTENTIAL CAPABILITIES FOR TESTING HEAT-PROTECTIVE MATERIALS IN ATMOSPHERIC PRESSURE GASES [*)]

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Plasma stands of the P-2000 installation of the Research Institute of Mechanics of Moscow State University allow obtaining and studying flows and stationary structures of low-temperature plasma of atmospheric pressure with a temperature of up to 10 kK. Plasma is created either in electric discharge chambers by separating initially closed electrodes [1-5] or in plasmatrons [6] – based on the use of capillary discharge technologies [7]. In arc discharges, plasma flows are electrode torches. In plasma torches, plasma flows both in the device channel and in free space. Low-temperature rarefied plasma flows are most widely represented in studies for practical applications [8,9] for space research. The processes of interaction of hot gas flows and dense plasma with solid barriers can be of interest for near-Earth aerodynamics and various applied technologies for the production of heat-resistant materials and waste disposal. The report presents the results obtained by processing and analyzing data from high-speed (1200 fps) video recording and synchronous recording of signals for discharge currents and voltages and high-speed pyrometry of the surface temperature of barriers. Data on stabilization of extended high-current (hundreds of amperes) arcs up to 320 mm and plasma flows up to 200 m/s are presented. The results of the interaction of flows with barriers are presented using the example of heating, melting, destruction of ceramic barriers and barriers based on technical pumice. They are of interest for modeling tests of protective coatings of aircraft during entry into dense layers of planetary atmospheres; for developing toxic waste disposal facilities; in testing technologies for plasma spraying of graphite powders on material surfaces. The work was carried out in accordance with the research plan of the Institute of Mechanics Lomonosov Moscow State University.

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