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THE USE OF THERMOELECTRIC RADIATION DETECTORS FOR HEAT FLUX MEASUREMENTS IN SHOCK-TUBES WITH GAS IONIZATION

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Abstract. Investigations of the ionized gases properties and their interaction with solid surfaces in aerospace applications is a key problem of modern re-entry technology [1,2]. Experimental investigations today conducted using pulsed gas-dynamic facilities, in particular shock tubes. Shock tubes are effective tools for creation and investigation of high-speed gas flows with the high stagnation pressure and temperature. The drawback of shock tube is a short working time – maximum test time does not exceed few milliseconds. Also, it should be noted that in the stagnation region of shock-heated gas there is an ionization so the gas has a strong radiation that affects heat fluxes significantly. Serious requirements are imposed to the diagnostic tools used for studying supersonic flows in terms of minimum dimensions, mechanical and thermal strength, sensitivity and noise immunity and a short response time. In this work we present thermoelectric heat flux sensors based on the artificially anisotropic film obtained by vacuum deposition. These sensors are successfully used in laser systems for measuring the radiation power [Glebov, 1994, Kotov 2021]. The use of such sensors allows us to study heat fluxes in a very hard conditions – for example with the use of inert gas Xenon as a working gas with significant ionization the heat flux of order of 20-30 Mw/m^2 can be measured.

References

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