INFLUENCE OF NEAR-WALL EFFECTS ON THE RESULTS OF INDUCTION TIME MEASUREMENT IN $H_2/O_2/Ar$ GAS MIXTURE IN SHOCK TUBES OF DIFFERENT ROUGHNESS

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Abstract: The article is devoted to the experimental study of the wall influence on the induction time measurements in the shock tubes. The results of the induction time measurtments behind the reflected shock wave at the constant density of gas are presented. The measurements were performed in a stoichiometric hydrogen–oxygen mixture diluted with 80% argon in a cylindrical shock tube using chemiluminescence of the OH radicals at a wavelength of 306 nm in the vicinity of the tube wall and on the axis of the tube at the endwall. To evaluate the effect of surface roughness on the measurement results, the experiments were carried out for the polished tube with arithmetic average roughness $R_a = 0.18$ μm and for the rough tube with $R_a = 20$ μm. The measurement uncertainty of the induction time depending on the choice of the optical window position at the endwall of the shock tube was calculated. On the base of the obtained results, it was concluded that there was no significant effect of surface roughness on the measurement results of the induction time in the cylindrical shock tube in the investigated range of thermodynamic parameters.

Keywords: roughness; shock waves; induction time

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