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Poster

DETAILED INVESTIGATION OF THE ELECTRIC DISCHARGE PLASMA BETWEEN COPPER ELECTRODES IMMERSED INTO WATER

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A phenomenological picture of pulsed electrical discharge in water is produced by combining electrical, spectroscopic, and imaging methods. The discharge is generated by applying 250 μs long 100 to 220 V pulses (values of current from 400 to 1000 A, respectively) between the point-to-point copper electrodes submerged into water. Plasma channel and gas bubble occur between the tips of the electrodes, which are initially in contact with each other. The study includes detailed experimental investigation of plasma parameters of such discharge using the correlation between time-resolved high-speed imaging, electrical characteristics, and optical emission spectroscopic data. Detailed analysis of obtained spectra of atomic copper, hydrogen and oxygen lines is performed. Spectroscopic methods, i.e. Boltzmann plots of copper lines' intensities, and widths of H_α and H_β hydrogen lines, exposed to the Stark mechanism of spectral lines' broadening, are used to determine the radial profiles of temperature and electron density, and composition of such plasma. Estimations of the electrodes' erosion rate and bubble's size depending on the electrical input parameters of the circuit are presented. Experimental results of this work may be valuable for the advancement of modeling and the theoretical understanding of the pulse electric discharges in water.