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Investigation of the temporal development of a spark channel in water KYOUNG-JAE CHUNG, JEONG-JEUNG DANG, YUNA LEE, SOOSEOK CHOI, SEOK-GUEN LEE, Y.S. HWANG, Seoul National University, DEPARTMENT OF NUCLEAR ENGINEERING COLLABORATION, CENTER FOR ADVANCE RESEARCH IN FUSION REACTOR ENGINEERING COLLABORATION — Temporal behaviors of a pulsed spark channel in water were investigated both numerically and experimentally. In a cylindrical chamber filled with water, a pulsed spark discharge was generated by applying high voltage pulse to the electrode at the center of the chamber. The intensity of a pressure wave along the distance from the spark channel as well as the voltage and current waveforms were measured during the discharge. In the numerical approach, one-dimensional magnetohydrodynamic equations were solved in the cylindrical coordinate with the equation of state for the high-temperature water plasma up 50,000K. The pulsed power system based on the capacitive energy storage was also included in the numerical analysis because the rate of an electrical energy input as a heating source for the channel is critical in this type of discharge. The expansion of the spark channel and the shock front were measured with various discharge conditions such as the charging voltage and the capacitance of the storage capacitor. The measured intensity of the pressure wave as well as the current and voltage waveforms was compared with the numerical results.

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