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Simulation with power circuit by modeling of plasmas within bubble in water HAYATO OBO, NOZOMI TAKEUCHI, KOICHI YASUOKA, Tokyo Institute of Tech. — Plasma is used in water treatments such as the decomposition of persistent compounds and the generation of chemically active species. We have developed a new plasma reactor with 21 treatment holes and successfully achieved the decomposition of organofluoric compounds by generating 21 plasmas in water. The equivalent circuit model of plasma within bubbles in water consists of plasma and water resistance. A typical plasma model consists of a Zener diode and cannot be used to express the transient state of plasma. In the Zener diode model, therefore, plasma cannot be simulated with a power circuit. In this work, we have developed a new equivalent circuit that consists of an ideal switch, a diode, and water resistance to model the plasma. With the circuit elements used in our model, it is possible to perform simulation of plasmas by modeling the generation as well as the extinction of plasma with a high voltage power circuit. We confirmed that the simulated voltage and current waveforms of the reactor were coincident with the experimental result by applying the variation of a plasma parameter in the plasma model.

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