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Calculation of Ablation Amount from Nozzle Caused by Radiation Using Three-Dimensional Electromagnetic Thermal Fluid Simulation
YUKI SUZUKI, SHOYA NISHIZAWA, YUSUKE NEMOTO, ZHENEWEI REN, YOSHIFUMI MAEDA, Tokyo City University Graduate School, TORU IWAO, Tokyo City University — The nozzle ablation of circuit breakers is the physical phenomenon caused by the heat and radiation of arc. In recent years, the air circuit breakers (ACB) that replaces the gas circuit breakers (GCB) for high voltage is required in order to reduce the environmental load. Thus, the cooling method using the ablation from nozzle has been proposed in order to improve the arc interruption performance of the ACB. The amount of ablation gas which generated from nozzle is important for efficient cooling of the arc. It is necessary to consider the ablation by heat transfer and radiation in order to clarify the amount of ablation gas. However, the time scales of heat input to nozzle are different for heat conduction and radiation. In addition, the amount of heat input to the nozzle and the amount of ablation gas generated by the radiation is not elucidated. In this paper, the ablation amount from nozzle caused by radiation using the three-dimensional electromagnetic thermal fluid simulation was calculated. As a result, the amount of ablation from nozzle caused by radiation increased with time. In addition, it was confirmed that the ablation gas caused by radiation was generated on the small time scale as compared with the heat conduction.

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