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Analysis of Driven Factor of Cathode Spot Initial Movement in Parallel Electrodes by Numerical Simulation ZHENWEI REN, YUSUKE NEMOTO, YOSHIFUMI MAEDA, TORU IWAO, Tokyo City University — The arc mobility increases along with the arc current increment in the case of an arc generated between a pair of parallel electrodes, which is different from the arc welding or the direct current interruption. It is assumed that the electromagnetic force derived from the electrodes become stronger with the arc current increasing, which benefits to the charged particles advance forward on the cathode surface and lead to the velocity of cathode spot increase. In order to find out the effect of self-magnetic field derived from the electrodes to the mobility of cathode spot, a rail-gun current path model and a straight current path model are simulated by a 3-dimensional electromagnetic thermal fluid simulation. External magnetic field is applied to the straight current path model for achieving the same mobility of cathode spot with the rail-gun current path model. It found out that the cathode spot advances because the balance of electromagnetic force on the cathode spot area is collapsed by the electromagnetic force derived from the electrodes. Therefore, the arc mobility increases with increasing the arc current in a pair of parallel electrodes.

Zhenwei Ren
Tokyo City University

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