

Abstract Submitted
for the GEC20 Meeting of
The American Physical Society

Contribution of Ion Distribution to Movement of Cathode Spot Affected by Amount of Metal Vapor in Vacuum Arc MASAHIRO TAKAGI, YUSUKE NEMOTO, ZHENWEI REN, YOSHIFUMI MAEDA, TORU IWAO, Tokyo City University — Vacuum arc has been applied for technology such as surface treatment of oxide layer, vacuum arc deposition. The vacuum arc produces a high-temperature, high-brightness cathode spot with high current density. It locally and instantaneously evaporates a cathode metal, and the metal vapor was ionized. The generated ions produce a high electric field near the cathode, which induces electron emission and forms a current path. This current path is deflected by the magnetic field and the cathode spot is considered to move. Therefore, it is necessary to understand the behavior of ions in the vicinity of the cathode spot. However, it is difficult to observe the motion of ions near the cathode spot experimentally because the cathode spot moves at a high speed. Therefore, contribution of ion distribution to movement of cathode spot affected by amount of metal vapor in vacuum arc was investigated by three-dimensional numerical simulation in this research. As a result, the cathode spot was moved because the moving direction of ions near the cathode was determined by electromagnetic force, then the ions were driven by force of pressure gradient, and current path was changed with varying time.

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Date submitted: 12 Jun 2020

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