Abstract Submitted
for the GEC20 Meeting of
The American Physical Society

Conditions for Retrograde Motion of Vacuum Arc Cathode Spot Affected by Initial Pressure YUSUKE NEMOTO, MASAHIRO TAKAGI, YUKI SUZUKI, ZHENWEI REN, YOSHIFUMI MAEDA, Tokyo City University Graduate School, TORU IWAO, Tokyo City University — The vacuum arc is maintained by the metal vapor from the cathode and moves at high speed. It has been reported that the vacuum arc cathode spot has the retrograde motion when the external magnetic flux is applied. Also, the retrograde movement of the vacuum arc cathode spot is reduced in the case of high initial pressure. From these reports, it was hypothesized that retrograde motion occurs when electrons and ions have different motions and energies in the low pressure. However, the conditions for retrograde motion of vacuum arc cathode spot have not been clarified because the vacuum arc is fast phenomenon and difficult to measure experimentally. Thus, it is important to analyze the sheath length, the mean free path, and the Debye length of the vacuum arc. In this paper, the conditions for retrograde motion of vacuum arc cathode spot affected by the initial pressure was elucidated. Specifically, the vacuum arc was analyzed by simulating the heat input to cathode and the evaporation of metal using the three-dimensional electromagnetic thermal fluid simulation with changing the initial pressure. As a result, it is possible to calculate the sheath length, the mean free path, and the Debye length of the vacuum arc when the vacuum arc cathode spot has the retrograde movement.

Yusuke Nemoto
Tokyo City University Graduate School

Date submitted: 17 Jun 2020 Electronic form version 1.4