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Self-organized plasmas formed by accumulated charge in dielectric barrier discharge HARUAKI AKASHI, TOMOKAZU YOSHINAGA, National Defense Academy — Atmospheric pressure dielectric barrier discharges (DBDs) have been widely applied to various research fields, such as bio-medical treatment, toxic decomposition and so on. However, the details of DBD have not been understood yet. Because the phenomena occur in nanosecond time scale under atmospheric pressure. It is known that DBDs are significantly affected by accumulated charges on dielectrics, but the distributions and development of accumulated charges are not known for years. To clarify the distributions and the developments of accumulated charges on dielectrics and electron behavior in the vicinity of dielectrics, DBDs in atmospheric pressure oxygen have been simulated using a two dimensional fluid model with relatively high electron emission coefficient. In this condition, DBD simulation results are obtained in so called self-organized form. As a result, the locations of highly accumulated charges are at where the primary streamers reached in a half cycle. And the charges on the dielectrics become almost zero by the electrons after the change of discharge voltage polarity. The electron distribution in the vicinity of the dielectric forms similar to that of accumulated charges to compensate the charges. Excess electrons in front of dielectric become the seed electrons for next half cycle. This continuation makes discharge in self-organized form.

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