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Dynamics of Contraction of Surface Barrier Discharge in Atmospheric Air. SERGEY LEONOV, Univ of Notre Dame — This study examines the morphology and charge transfer dynamics of surface dielectric barrier discharge depending on the supplied voltage waveform: single polarity vs alternating polarity. Diagnostics included electric measurements, camera imaging, optical emission spectroscopy, and a set of original charge sensors [S. Leonov et al J. Phys. D: Appl. Phys., vol. 47, p. 465201, 2014]. Two basic modes were analyzed: diffusive and filamentary. The key factor of the discharge dynamics is the development of ionization instability causing the contraction of the discharge current and formation of the filamentary, highly conductive plasma during both positive and negative polarities. A main criterion of the discharge contraction is the generation of a zone with a high level of longitudinal electric field, not less than 15 kV/cm, realized during the alternating of the sign of surface charge. It is shown that the alternating polarity of the supplied voltage accompanied with the process of discharge contraction gives a significant benefit in the surface area covered by the discharge and in the power deposition, increasing it 2-4 times.

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