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Numerical Investigations of Positive Surface Streamer Discharges For High-Pressure Large Gap Arc Breakdown ASHISH SHARMA, LAXMINARAYAN RAJA, Dept. of Aerospace Engineering and Engineering Mechanics, The University of Texas at Austin — Streamers are thin conducting channels which are formed by application of fast high-voltage pulses at the electrode surface. Surface streamers are used in a flash-lamp approach to initiate an arc breakdown in a large electrode gap at atmospheric and higher pressures. In this study, high-fidelity simulations are performed to study the propagation of cathode directed surface streamers into high pressure argon medium. The streamer model employed is based on the self-consistent multispecies and continuum description of the plasma. The model predicts transient dynamics of a surface streamer. Of particular interest is the conductivity of the streamer channel as a function of the electron density in the trail of the streamer head. The spatially continuous conductive streamer successfully bridges the gap between two electrodes from which an arc column can develop. The model predicts the conductivity of the streamer column as a function of gas properties, applied voltages on the electrodes and wall losses. The Model results compare favorably with accompanying experimental results for a flash-lamp based approach for large gap arc breakdown.

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