The dynamics of streamers in PIC-DSMC simulations of 3D pin-to-plane wedge geometries are formally quantified for several azimuthally swept wedges in terms of electron velocity and density as temporal functions of spatial direction and coordinates $r, \phi, z$. Particles are tracked with picosecond temporal resolution out to 1.4 nanoseconds, spatially binned, and averaged over six independent simulations each sourced with a random plasma seed. An air model\(^1\) comprised of Townsend breakdown and streamer mechanisms via tracking excited state neutrals that can either undergo quenching or spontaneous photon emission collisions\(^2\) is employed. A 100 µm radius 1 eV plasma with a $10^{18} \text{ m}^{-3}$ particle density placed at the tip of a 100 µm hemispherical pin electrode (at 6 kV) in a 600 Torr air filled gap, 1.5 mm above a planar grounded cathode, seeds the domain. Prior 2D studies have shown that the reduced electric field, $E/n$, can significantly impact streamer evolution\(^3\). We extend the analysis to 3D wedge geometries (to limit computational costs) with wedge angle azimuthally swept in 15° increments from 15° to 45° to examine the wedge angle’s effect on streamer branching, propagation, and velocity. Initial results suggest that solution convergence in terms of the parameters described above may be achievable.


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