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Electric Field Filamentation and Higher Harmonic Generation in Very High Frequency Capacitive Discharges SARVESHWAR SHARMA, Institute for Plasma Research, NISHANT SIRSE, School of Physical Sciences and NCPST, Dublin City University , ABHIJIT SEN, Institute for Plasma Research, JONG-SHINN WU, National Chiao Tung University (NCTU), MILES TURNER, School of Physical Sciences and NCPST, Dublin City University — The effects of the discharge voltage on the formation and nature of electric field transients in a symmetric, collisionless, very high frequency, capacitively coupled plasma are studied using a self-consistent particle-in-cell (PIC) simulation code. At a driving frequency of 60 MHz and 5 mTorr of argon gas pressure, the discharge voltage is varied from 10 V to 150 V for a fixed discharge gap. It is observed that an increase in the discharge voltage causes filamentation in the electric field transients and to create multiple higher harmonics in the bulk plasma. Correspondingly, higher harmonics, up to 7^{th} harmonic, in the discharge current are also observed. The power in the higher harmonics increases with a rise in the discharge voltage. The plasma density continues to increase with the discharge voltage but in a non-linear manner, whereas, the bulk electron temperature decreases. Meanwhile, the electron energy distribution function (EEDF) evolves from a Maxwellian at lower discharge voltages to a bi-Maxwellian at higher discharge voltages.

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