

Abstract Submitted
for the GEC05 Meeting of
The American Physical Society

Breakdown in dual frequency capacitive discharges MILES M. TURNER, Dublin City University, Ireland — There are two classical mechanisms of breakdown. At low frequencies, an ion-controlled Townsend mechanism prevails, and at high frequencies, there is an electron-controlled breakdown. Among other points, these mechanisms differ in the character of the particle orbits. At low frequency, no particle orbits close within the plasma volume. At high frequency, nearly all particle orbits do so. In this paper we show that there is a third breakdown mechanism at intermediate frequency, where ion orbits are mainly closed and electron orbits are mainly open. In this regime, the dominant ionization mechanism is via electrons produced by fast neutral impacts on the electrodes. We will show that this intermediate frequency mechanism is likely the dominant breakdown process in dual frequency discharges, with the surprising implication that the discharge is initiated by the lower frequency in typical cases.

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Date submitted: 10 Jun 2005

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