MODELING OF RADIO-FREQUENCY BREAKDOWN BY MONTE CARLO TECHNIQUE

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Abstract. Plasmas ignited by radio-frequency (RF) electric fields are widely used in many applications. Accordingly, scientific research is ranges, from experimental setups through mathematical models, relevant data and applications. Defining information for any application of RF plasmas are its breakdown voltage and related gas pressure. Monte Carlo proved to be a reliable technique for modeling voltage breakdown curves of RF plasmas. Recent research explained double valued nature of RF breakdown voltage curves and scaling law of those curves (Savić et al 2011), gave an insight of the physical nature of the RF breakdown (Puač et al 2018) and the role of attachment in presence of oxygen (Puač et al 2020). In this paper we review our findings on the underlying physics of RF breakdown and we present a versatile numerical tool for simulation that has no inherent limitations.

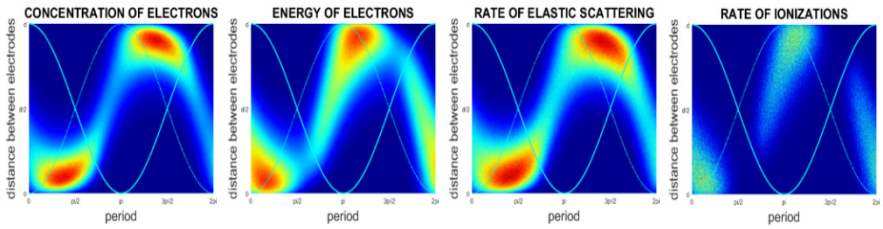

Figure 1: Spatial profiles of electron concentration, energy, and rates of elastic scattering and ionization. Background gas is helium, pressure and voltage are 1.13Torr and 330V, gap between electrodes is 23mm and frequency is 13.56MHz.

References

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