Abstract Submitted
for the GEC18 Meeting of
The American Physical Society

Analysis of the power dissipation in a lumped element model for capacitive discharges DENNIS ENGEL, LAURA KROLL, SCHABNAM NAGGARY, RALF PETER BRINKMANN, Institute of Theoretical Electrical Engineering, Ruhr University Bochum — Capacitively coupled plasmas (CCPs) are widely used in material processing and other applications. Despite several decades of research, not all important physical processes are fully understood. Modelling and simulation approaches help to get a better insight. Spatially resolved models like particle-in-cell simulation, kinetic, or fluid models are generally computational expensive. Global models, in contrast provide a simple understanding of CCPs with comparatively little effort.

This work revisits an existing lumped element model [1], in which the plasma bulk is represented by a lossy inductor and the sheath by a non-linear capacitive diode, employing a matrix sheath model. Ziegler et al. [2] used this model to calculate the power dissipation inside the plasma bulk. However, a closer analysis shows that the matrix sheath assumption leads to inconsistencies. Here, an improved sheath model applied to analyze the power dissipation. The outcome is remarkably different from that of the former model.

[1] T. Mussenbrock et al., PSST **16**, 377385 (2007)
[2] D. Ziegler, T. Mussenbrock, R. P. Brinkmann, Physics of Plasmas **16**, 023503 (2009)

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Date submitted: 15 Jun 2018 Electronic form version 1.4