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A Simplified Model of The Electrical Asymmetry Effect DOUGLAS L. KEIL, EDWARD AUGUSTYNIAK, YUKINORI SAKIYAMA, PAVEL NI, Lam Research Corporation — Dual Frequency Capacitively Coupled Plasmas (DF CCP) have been used extensively in semiconductor processing. One of the most promising methods for extending CCP technology is the application of the Electrical Asymmetry Effect (EAE). Extensive studies of this effect have appeared in the literature and the effect can be claimed to be reasonably well understood [1]. However, the complexity of the available models often makes them unwieldy for resolving engineering issues and for analysis of test data. In this work it is shown that most of the industrially important features of the EAE effect can be captured with a greatly simplified model. Although approximate, this simplified model enables relatively quick design guidance and simplifies analysis of test data. Electrical measurements of the EAE effect from a commercially relevant CCP plasma deposition tool are presented. These results show good agreement with the model and serve to illustrate the basic features of the model.

[1] U Czarnetzki et.al, Plasma Sources Sci. Technol. 20 (2011) 024010.

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