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The effect of the driving frequencies on the Electrical Asymmetry Effect in dual-frequency capacitive radio frequency plasmas JULIAN SCHULZE, Ruhr-University Bochum, IHOR KOROLOV, Hungarian Academy of Sciences, UWE CZARNETZKI, Ruhr-University Bochum, ZOLTAN DONKO, Hungarian Academy of Sciences — In capacitive radio frequency discharges driven by two consecutive phase locked harmonics, an electrical asymmetry is induced and a DC self bias is generated as a function of the phase shift between the driving frequencies. Until now, only dual-frequency discharges operated at a fundamental frequency of 13.56 MHz have been investigated. It was shown, that a maximum self bias of 25% of the driving voltage amplitude can be generated electrically and that the mean ion energy at the electrodes can be controlled separately from the ion flux by adjusting the phase in a geometrically symmetric reactor. Here, we study the effect of changing this fundamental frequency between 0.5 MHz and 27.12 MHz on the Electrical Asymmetry Effect by Particle-in-Cell simulations and an analytical model for different γ-coefficients. We find the electrical generation of the DC self bias and the quality of the separate control of ion properties to be strongly reduced at lower frequencies. This is caused by the effect of the driving frequencies on the charge and electron heating dynamics. These effects are understood by the model.

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