STUDY OF STOCHASTIC HEATING USING PARTICLE-IN-CELL SIMULATION IN SINGLE FREQUENCY CAPACITIVELY COUPLED PLASMA DISCHARGES

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The important phenomenon in low pressure radio-frequency capacitive discharges is stochastic heating. Ohmic heating is not the main source of power absorption. The electrons gain energy by interacting with the high voltage oscillating sheath. This phenomenon has been investigated by different analytical models\textsuperscript{2,3,4} using several different approaches and has produced results that are broadly in agreement insofar as scaling with the discharge parameters is concerned, but there remains some disagreement in detail concerning the absolute size of the effect. Benchmarking of these analytical models has been done by Kawamura et al.\textsuperscript{1}, using particle-in-cell simulation but the data points are rather small.

One aim of present work is to produce a relatively extensive set of simulation data that may be used to validate theories over a wide range of parameters. The other aim is the investigation of the limitation of scaling laws, especially in the case of high frequency ($\omega_{pe} < \omega_{rf} < \omega_{pe}$). Effect of frequency variation on stochastic heating has been investigated in argon discharges here.


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