PPPS 2019



Contribution ID: 571

Type: Poster

2P32 - Study of two-surface multipactor susceptibility using Monte Carlo simulation

Tuesday 25 June 2019 13:00 (1h 30m)

Multipactor is a nonlinear phenomenon driven by an rf electric field in which secondary electron emission from metallic or dielectric surfaces, leads to an exponential growth of charge. It is harmful to satellite communications and microwave systems [1]. Here, we apply Monte Carlo (MC) simulation [2] to study the multipactor susceptibility in a gap between two parallel metallic electrodes. For a given fD (f is the frequency of rf field, D is the gap distance between the two surface), we scan the average secondary electron yield (SEY) for a range of magnitude of the input microwave voltage V using MC simulation, to obtain the multipactor susceptibility diagram in the V-fD plane. The results are obtained for secondary emission processes with SEY based on Vaughan's model [3], with fixed emission energy and normal emission angle, and with random initial energy and angle following a preassigned distribution. For both cases, the MC results are different from the analytical theory [2,3]. Analysis of the electron trajectories reveals that the deviation from the analytical theory is due to the presence of mixed multipactor mode.

- 1. Special sessions on Multipactor, I and II, ICOPS, Denver, CO, June 2018.
- 2. R. A. Kishek, Y. Y. Lau, L. K. Ang, A. Valfells, and R. M. Gilgenbach, Phys. Plasmas 5, 2120 (1998).
- 3. J. R. M. Vaughan, IEEE Trans. Electron Devices 35, 1172 (1988).

Work supported by AFOSR MURI Grant No. FA9550-18-1-0062.

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Session Classification: Poster - Microwave Generation and Plasma Interactions and Pulsed Power Switches and Components

Track Classification: 2.7 Microwave Plasma Interaction