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Analysis and measurement of diffusion-limited resonant electron RF discharges AIMEE HUBBLE, ROSTISLAV SPEKTOR, ALEX FARKAS, ALEXANDRIA LANGFORD, NISHANT PRASADH, PRESTON PARTRIDGE, TIMOTHY GRAVES, The Aerospace Corporation — Electron multipactor discharges develop as electrons impact surfaces in resonance with the RF electric field. In general, multipactor can occur if electron growth is larger than electron loss from angular emission, electric/magnetic field distribution, or geometry. In situations with parallel DC magnetic fields, angular secondary emission can lead to Larmor motion perpendicular to the B field and alter the discharge formation and electron diffusion. Experimental and numerical results indicate strong reductions in the breakdown threshold in cases with E parallel to B. Results for multiple geometries and frequencies illustrate threshold reductions with increasing parallel B field until the breakdown threshold becomes asymptotic with decreasing Larmor radii. Numerical and analytical descriptions depict diffusion-limited regimes in which the electron transit time and Larmor radius confine particles to the local breakdown region. This is balanced by the electrode secondary electron yield, which is shown as a critical parameter. A similar balance is shown to govern multipactor in low aspect ratio geometries. Results provide new insight into margin prediction and design rules for RF devices and parameters dictating breakdown thresholds.

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