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**Electron current evolution of a two-surface multipactor discharge** TIMOTHY GRAVES, ROSTISLAV SPEKTOR, DANIEL LARSON, The Aerospace Corporation — Multipactor discharge can occur as electrons impact surfaces in resonance with RF or microwave fields. This pure electron discharge is sustained by secondary electron emission from the electrode materials. The growth in the electron number density requires sufficient secondary electron emission to overcome particle losses, mandating a secondary electron yield (SEY) greater than unity for successful multipactor development. The rate at which the multipactor develops is determined primarily by the magnitude of the SEY at the primary electron impact energies, which is also coupled to the multipactor resonant conditions. In this work, we experimentally measure the multipactor rise time of the discharge at frequency ranges between 0.5 and 2 GHz in both parallel plate and coaxial geometries. Using high gain current amplifiers, the temporal evolution of the discharge current is measured at different frequencies, geometries, and power levels and compared to the discharge saturation time. Such current measurements provide experimental insight toward the various "Crossing Rules" used to determine multipactor margin in multicarrier RF systems. Employing multiple fast electron current probes, an electron time-of-flight diagnostic for multipactor location determination is demonstrated in a rigid coaxial transmission line.

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