

Local power coupling as a predictor of high-gradient breakdown performance

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A novel quantity for predicting the ultimate performance of high-gradient radiofrequency accelerating structures will be presented and compared with earlier quantities that it builds on such as the modified Poynting vector, S_c . This new method models a nascent RF breakdown as a current-carrying antenna and calculates the coupling of the antenna to the RF power source. With the help of a simple electron emission model to describe a nascent breakdown, the antenna model describes how a breakdown modifies the local surface electric field before it fully develops in any given structure geometry. For the structure geometries that this method was applied to, it was found that the calculated breakdown-loaded electric field was well-correlated with spatial breakdown distributions, and gave consistent values for the maximum breakdown-limited accelerating gradient between different structures.

Summary

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