MODELING MICROWAVE TRANSMISSION IN ELECTRON CLOUDS

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Abstract

Microwave transmission in accelerator beam pipes is providing a unique method for determining electron cloud characteristics, such as density, plasma temperature, and potentially the efficacy of electron cloud mitigation techniques. Physically-based numerical modeling is currently providing a way to interpret the experimental data, and understand the plasma-induced effects on rf signals. We report here recent applications of numerical simulation of microwave transmission in the presence of electron clouds. We examine the differences in phase shift induced by $T \cdot 10^{11}$ and TM01 modes in circular cross section beam pipes for uniform density electron clouds. We also detail numerical simulation of the cyclotron resonance and examine how the width of the resonance changes with applied dipole magnetic fields strength and cloud temperature.

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