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RF power loss and electric and magnetic field enhancements due to surface roughness¹ PENG ZHANG, YUE YING LAU, RONALD GILGENBACH, University of Michigan - Ann Arbor — Surface roughness plays an important role in a cavity or slow wave structure. It may cause enhanced RF power absorption. Excessive local electric field enhancement may trigger RF breakdown. In a superconducting cavity, local magnetic field enhancement due to surface roughness may lead to rapid loss of superconductivity. In this work, we analytically compute the power absorption due to a hemispherical protrusion with arbitrary values of ϵ , μ and σ on a metallic surface. Scaling laws are derived [1]. The local field enhancement factors of both electric and magnetic field on the protrusion are also calculated analytically, and spot-checked against a Maxwell-3D code [1]. The protrusion may represent a foreign object, or is made of the same material as the conducting surface, since its ϵ , μ and σ may take on arbitrary values.

[1] P. Zhang *et al.*, J. Appl. Phys. **105**, 114908 (2009).

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