Abstracts

Polarizabilities of an Annular Cut in the Wall of an Arbitrary Thickness

The knowledge of electric and magnetic polarizabilities of an aperture is often required in problems related to waveguide coupling and diffraction of EM waves by apertures. The beam coupling impedances due to a small discontinuity on the chamber wall of an accelerator can also be expressed in terms of the polarizabilities of the discontinuity. The polarizabilities are geometrical factors which can be found by solving a static (electric or magnetic) problem. However, they are known in an explicit analytical form only for a few simple-shaped discontinuities, such as an elliptic hole in a thin wall. In the present paper the polarizabilities of a ring-shaped cut in the wall of an arbitrary thickness are studied using a combination of analytical, variational and numerical methods. The results are applied to estimate the coupling impedances of button-type beam position monitors.

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