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Title:Thin film reflection properties of a warm isotropic plasma slab between two half-space dielectric media
Authors:Markos, Constantine Taki (1); Kalluri, Dikshitulu (1)
Author affiliation:(1) Electromagnetics and Complex Media Research Laboratory, Department of Electrical and Computer Engineering, University of Massachusetts, Lowell, Lowell, MA, United States
Corresponding author:Markos, C.T.(ctm@ieee.org)
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Abstract: This paper describes electromagnetic wave behavior within a thin metal film bounded by two different dielectric materials. The film is isotropic, homogeneous, temporally and spatially dispersive with complex refractive index n_p. The geometry of the film is a slab bounded by half-space dielectrics of refractive indices n_I (input medium) and n_T (output medium), which are assumed to be real. Since the film is spatially dispersive it is modeled as a warm plasma using macroscopic Maxwell's equations coupled with hydrodynamic equations for a compressible electron gas. The electron gas or plasma considers positive ions to be stationary, in the background, ensuring overall charge neutrality. The waves at the input, output and inside the plasma slab are described. The characteristic roots for the warm plasma are derived from the dispersion relation for oblique incidence of the wave in the input medium of refractive index n_I. The power reflection coefficient for refractive indices ≥ 1 is derived and its results are presented in segmented regions bounded by the zeros of the characteristic roots known as critical points.