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P. I. ZABOLOTNYI

MODEL OF H-POLARIZED WAVE PROPAGATION IN A MULTILAYER DIELECTRIC STRUCTURE

Institute of Technical Mechanics
of the National Academy of Sciences of Ukraine and the State Space Agency of Ukraine
15 Leshko-Popel St., Dnipro 49005, Ukraine; e-mail: mwave@ukr.net

This paper addresses the determination of the dielectric constant of multilayer dielectric structures. One of the most-used methods for determining the dielectric constant of multilayer structures is reflection coefficient measurement by interferometry. In the general case, in interferometry measurements to one measured value of the reflection coefficient there may correspond an infinity of dielectric constants. This ambiguity may be resolved by first determining the effect of different parameters of the probing electromagnetic wave on the reflection coefficient. In particular, it is important to have a preliminary estimate of the effect of the incidence angle and the polarization on the range of variation of the reflection coefficient with the variation of one of the structure parameters. This allows one to estimate the boundaries of the range of variation of the reflection coefficient with the variation of the parameter under study.

This paper considers the case where a plane H-polarized electromagnetic wave, i.e. a wave whose magnetic field is perpendicular to the incidence plane, is incident on a multilayer dielectric structure. The aim of this work is to develop a model of the propagation of an H-polarized electromagnetic wave through a multilayer dielectric structure at an arbitrary incidence angle and to determine the range of variation of the reflection coefficient with the variation of the dielectric constants of the layers. The paper presents a model of the propagation of an H-polarized electromagnetic wave in a two-layer dielectric structure. A metal base, which is an ideal conductor, underlies the structure. The electromagnetic wave is incident from the air at an arbitrary incidence angle. The model allows one to estimate the reflection coefficient of the structure as a function of its parameters and the incidence angle. The model also makes it possible to analytically estimate the range of variation of the reflection coefficient with the variation of the dielectric constant and the thickness of each layer of the structure. Using the model, the magnitude of the reflection coefficient was determined as a function of the incidence angle and the dielectric constant of the second layer.

Keywords: *H-polarization, dielectric constant, reflection coefficient, multilayer dielectric structures.*

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