

## Physical Optics for Bodies with Anisotropic Surface Impedance

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The physical optics approximation is considered for bodies with an anisotropic surface impedance boundary condition. The far scattered field and the monostatic radar cross section are examined in detail for the case when the illuminated surface of the scatterer is symmetric with respect to a plane parallel to the direction of propagation of the incident wave, under certain symmetric behaviors of the surface anisotropy. Considerations are also developed for bistatic scattering. The analysis is based on the method of stationary phase (see, e.g., M.M. Tenenbaum, *Radiotekhnica i Elektronika*, vol. 5, no. 12, pp. 1909 ff., 1960), and represents a generalization of previously known results for the case of an isotropic surface impedance (see P.L.E. Uslenghi, *Alta Frequenza*, vol. 33, pp.541-546, 1964).

The presence of a nonzero surface impedance leads to a depolarization of the backscattered field whose magnitude is dependent on the surface impedance anisotropy. The anisotropy in the surface impedance may be realized by the use of composite materials (either as bulk materials or coating layers), or surface corrugations. The results obtained are applied to a variety of scattering shapes (both smooth and with edges) and surface anisotropies. The validity of the physical optics approximation for the case under study is checked by comparison with other analytical theories such as the geometrical theory of diffraction, as well as with numerical approaches. General conclusions are drawn on the limits in the applicability of physical optics to the general problem considered.