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Complex Source Beam Diffraction by a Wedge

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A Uniform Geometrical Theory of Diffraction (UTD) solution for inhomogeneous plane wave diffraction by a Perfect Electrically Conducting (PEC) wedge has been presented in [1]. More recently, this solution has been extended to analyze the case of an incident field radiated by a source located in the complex space (Complex Source Beam, CSB) [2], [3]. This solution has shown to be very accurate when compared with reference data obtained by a rigorous multipole expansion of the field. The purpose of this communication is to further investigate some interesting properties of the extended UTD solution, opening the way to a better understanding of the physical phenomena connected to an evanescent behavior of the waves impinging on the edge.

In the context of high-frequency techniques, the UTD solution for CSB diffraction in [2] has been written in a simple and compact form which includes the incident, the reflected and the diffracted ray contributions, so that it can be directly applied to calculate the scattering from more complex geometries with edges [4], [5].

Here, the analysis is oriented to gain a better understanding of the mechanism which controls discontinuity compensations at shadow and reflection boundaries. Also, attention is focused on the identification of shadow and reflection boundaries, as well as in determining both the shape and the extension of the pertinent transition regions. All these investigations are verified through comparisons with a rigorous multipole expansion solution.

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