MATHEMATICS

Spectral equations for scattering by impedance polygons : properties and solutions

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The Sommerfeld-Maliuzhinets representation of fields is not limited to the study of the diffraction by isolated impedance wedges, and we developed in [1]-[2] an analytical method concerning the determination of spectral function for the scattering in free space by an impedance polygonal object (convex or not). This method is now quoted and used by other authors [3], but other approaches exist, as in [4]-[13] for cavities, perfectly conducting object, and some specific geometries by asymptotic or exact reduction, or as in [14] by iterative reduction. Our approach is exact for general impedance polygons with finite or infinite surfaces. For that, we consider special features of single face expression of spectral function, that we defined in [1]-[2], to develop exact functional difference equations, then Fredholm integral equations, that can be solved exactly, but also asymptotically, considering small or large faces. We detail here novel properties. Existence and uniqueness of solutions are, in particular, analysed in a new original manner, while some refined asymptotics are presented.