Abstracts

Multimode Network Description of a Planar Periodic Metal-Strip Grating at a Dielectric Interface--Part III: Rigorous Solution

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In a recent pair of papers we studied the scattering problem posed by a plane wave incident at an angle on a plane, periodic, metal-strip grating at a dielectric interface. In the first paper (Part I) we formulated the solution to the scattering problem in terms of novel multimode equivalent network representations. The analytical phrasing followed in Part I led to two Fredholm integral equations of the first kind with singular kernels. In the second paper (Part II) we presented two approximate solution procedures for those integral equations that led to four simple and accurate equivalent network representations for the scattering problem under investigation. In this paper (Part III) we further this investigation by deriving a novel rigorous analytical solution for one of the two integral equations derived in Part I. We obtain closed-form, rigorous, analytical expressions for the elements involved in the equivalent network representations derived. Finally, we present the results of a number of numerical computations carried out by using the rigorous equivalent networks developed.

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