Analysis of Electromagnetic Scattering from Doubly Periodic Nonplanar Surfaces Using a Patch-Current Model

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***Abstract*— A novel solution is presented for the problem of electromagnetic scattering of a time-harmonic plane wave from a nonplanar doubly periodic surface separating two contrasting homogeneous media. The reflected and the transmitted fields are approximated by a linear combination of the fields due to sets of fictitious patch sources supporting surface currents of cross-polarization. Spatially periodic and properly modulated, these fictitious sources lie at some distance from the physical surface, each in a plane parallel to the directions of the periodicity. The fields radiated by these patch sources are computed by summing a spectrum of Floquet modes. The complex amplitudes of these fictitious sources are adjusted simultaneously to render the tangential components of the electric and magnetic fields continuous at a selected set of points on the surface. The suggested procedure is simple to implement and is applicable to arbitrary, smooth, doubly periodic surfaces. The accuracy of the method has been demonstrated for doubly periodic sinusoidal surfaces. Perfectly conducting surfaces have also been treated within the general procedure as a reduced case.**

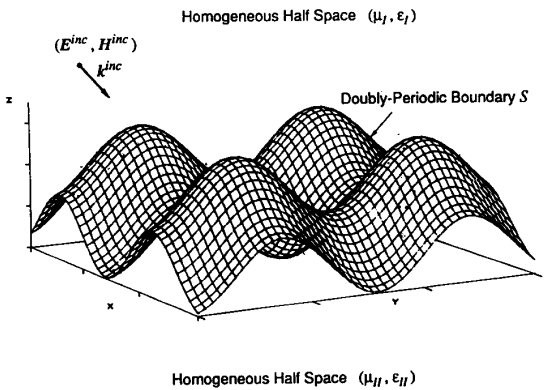

Fig. 1. General problem of plane wave scattering from a doubly periodic surface.