Analysis of Electromagnetic Scattering from Dielectric Cylinders Using a Multifilament Current Model

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Abstract—**A moment solution is presented for the problem of transverse magnetic (TM) scattering from homogeneous dielectric cylinders. The moment solution uses fictitious filamentary currents to simulate both the field scattered by the cylinder and the field inside the cylinder and in turn point-matches the continuity conditions for the tangential components of the electric and magnetic fields across the cylinder surface. The procedure is simple to execute and is general in that cylinders of arbitrary shape and complex permittivity can be handled effectively. Metallic cylinders are treated as reduced cases of the general procedure. Results are given and compared with available analytic solutions, which demonstrate the very good performance of the procedure.**

outside the cylinder. Notice that this is somewhat different than the application of the equivalence principle, known as the coupled surface integral equation formulation in which equivalent surface electric and magnetic currents are used. Here, we are actually using the fields generated by the filamentary sources, which are situated at some distance from the boundary surface, as a basis of smooth field functions for representing smooth fields on the boundary surface. The advantage of our technique is that it evades the necessity of integrating surface currents when computing the fields, thereby rendering the numerical solution and subsequent field