A Method of Moments Analysis of Electromagnetic Coupling Through Slots Using a Gaussian Beam Expansion

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Abstract—**A moment solution is presented for the problem of transverse electric (TE) (to the slot axis) electromagnetic coupling through a slot in infinitesimally thin perfectly conducting screen separating two identical or contrasting half-space regions. The moment solution uses sets of properly shifted and modulated Gaussian elementary beams to expand the unknown equivalent magnetic current and a simple point-matching procedure for testing. The Gaussian expansion offers a numerical advantage in subsequent field calculations. Instead of facing the need to integrate over surface currents when computing the fields, the proposed expansion allows the evaluation of the fields by summations of analytic terms exploiting the simple and well understood propagation features of Gaussian beams. Sample computations are given and compared with a standard pulse–pulse Galerkin solution.**

up into two regions that are related by the postulated magnetic current sheets, but otherwise can be formulated independently of one another. Next, an operator equation for the magnetic current is derived by enforcing the components tangential to the slot of the magnetic field to obey the continuity condition across the slot. A solution of the problem is then obtained by solving this operator equation for the equivalent magnetic current. If the operator equation were satisfied exactly, we would have the true solution. To obtain an approximate solution, it is convenient to reduce the operator equation to matrix form via the method of moments [9]. In the method of moments,