

ABSTRACT

A new efficient method named the Asymptotic Phasefront Extraction MoM (APE-MoM) is introduced for reducing the exorbitant dependence on computer storage and solution time in the Method of Moments (MoM) for electrically large electromagnetic scattering problems. The unknown surface currents on large, smooth parts of a PEC scatterer are expressed by an efficient set of linearly phased surface current basis functions. The phasefront characteristics of the surface currents are numerically extracted from known current samples obtained from a lower frequency solution of the same configuration. The use of such efficient basis functions, which are constructed in terms of linearly phased currents at higher frequencies, is justified by considering the form of the surface currents predicted by high-frequency asymptotic ray methods. The procedure for extracting the current phasefronts is purely numerical, obviating computationally expensive and non-robust operations such as ray-tracing, and thus is amenable to general purpose scattering codes. The APE-MoM, while greatly relieving the storage and solution time of the conventional MoM, is shown to accurately reproduce the induced surface currents and scattered fields of some chosen targets.