# ABSTRACT

An efficient and accurate hybrid method based on the combination of the method of moments (MoM) with a special Green's function in the space domain is presented to analyze antennas and array elements conformal to material coated large circular cylinders. This method can be used for the analysis and design of microstrip structures mounted on aircraft, spacecraft and many types of mobile communication applications where low cost, light weight and direct integrability with other devices are important. The efficiency and accuracy of the method strongly depends on the computation of the Green's function which is the kernel of the integral equation solved via MoM for the unknown equivalent currents representing only the antenna elements. Therefore, three types of space domain Green's function representations are used interchangeably, based on the computational efficiency of their calculation and the region where they remain highly accurate. The first one is the steepest descent path (SDP) representation of the special Green's function. This representation is based on obtaining a circumferentially propagating series representation of the appropriate Green's function from its radially propagating counterpart and its efficient numerical evaluation along a steepest descent path (SDP) on which the integrand decays most rapidly. The self and neighboring term calculations in the MoM procedure are performed using an efficient integral representation of the planar microstrip dyadic Green's function. This is based on the assumption that for an electrically large dielectric coated cylinder small separations between source and observation points can be treated as flat surfaces. To calculate the mutual coupling between two current modes in the paraxial (near axial) region (i.e., close to the normal section of the cylinder, passing through the source point and parallel to the cylinder axis), another space domain representation is obtained based on the fact that the circumferentially propagating series representation of the appropriate Green's function is periodic and hence can be approximated by a Fourier series where only the first two terms are included. Consequently, besides combining different representations of the Green's functions with the MoM