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Roberto D. Graglia and Guido Lombardi
Dipartimento di Elettronica, Politecnico di Torino,
Corso Duca degli Abruzzi 24, 10129 Torino, Italy.
emails: roberto.graglia@polito.it, guido.lombardi@polito.it

Higher order models of conducting structures with sharp edges for the MoM (Method of Moments) solution of electromagnetic scattering problems are considered. The first kind of problems we address is how to represent, with a subsectional bases approach, the possible singular behavior of the current and of the surface charge in the vicinity of the edges. We then report on the solution of the various integration problems one is faced with when dealing with the joint presence of field and Green's function singularities.

Though the singular behavior of the electromagnetic field and current is isolated near the vicinity of the edge, usual regular vector bases require the expensive use of dense meshes in the neighborhood of edges in order to accurately model the fields, even when high-order regular vector bases are used. As a matter of fact, in the edge-region, no polynomial adequately approximates the infinite behavior and the algebraic behavior of fractional orders of the various factors that appear in the expression of the current and field components. It is therefore very convenient to introduce and use vector basis functions that incorporate the edge condition and are able to precisely model the singular behavior of fields and currents in the neighborhood of the edge, without resorting to the use of denser meshes. *Singular* divergence-conforming bases of this kind for curved triangular and quadrilateral elements have been previously defined by these authors. In the presentation we review the properties of the existing singular bases and discuss alternative approaches for generating bases of the lowest order. Higher order bases can be constructed from the lowest order one by use of a simple, general technique discussed elsewhere (R.D. Graglia and G. Lombardi, IEEE **TAP**–52, 1672-1685, 2004). Notice that our divergence conforming singular functions are compatible with standard p-th order vector functions in adjacent elements (R.D. Graglia *et al.*, IEEE **TAP**–45, 329–342, 1997), and guarantee normal continuity along the edges of the elements allowing for the discontinuity of tangential components, adequate modelling of the divergence, and removal of spurious solutions.

The problem of numerically integrating the singular Green's function times singular, as well as regular expansion functions has been carefully studied, and the presentation considers various techniques to evaluate the MoM matrix coefficients, including modifications of the integration technique based on the singularity cancellation algorithm (M. A. Khayat and D.R. Wilton, IEEE **TAP**–53, 3180-3190, 2005). Notice that, for self and near-self element evaluations, we were obliged to develop new numerical techniques to perform the MoM *testing* integrals, because the fields radiated by the singular basis functions have algebraic behavior of fractional orders in the near-edge region. We investigated on special numerical integration recipes which are not based on the classic Gauss-Legendre rules, with further details presented at the Conference. Finally, several results to show the convergence properties of our singular bases are presented for scattering problems at plane wave incidence.