Integration of Singular Basis Functions for Plate Edges and Corners

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Hierarchical divergence conforming bases for *edge* singularities in quadrilateral cells were recently developed by these authors and presented in two companion papers (R.D. Graglia, A.F. Peterson, and P. Petrini, *IEEE TAP*, vol. 66, pp. 6191-6201, pp. 6217-6224, Nov. 2018). Singular basis functions to deal with *corner* singularities have been proposed by other authors as summarized in A. F. Peterson, R. D. Graglia, *IEEE J-MMCT*, vol. 1, pp. 161 - 175, 2016. New singular corner bases were also proposed in R.D. Graglia, A.F. Peterson, and P. Petrini, *EuMC*, pp. 1182-1185, 2018. In order to evaluate the effectiveness of corner bases in improving the accuracy of the results for electromagnetic scattering from conducting plates, algorithms for computing the MoM matrix entries must be developed for the self-cell and near-self-cell regions. One such algorithm will be described in this presentation.

The corner singularity is distinct from the edge singularity and may involve a smaller (negative) exponent depending on the angle associated with the corner. In addition to these *immobile* singularities, there is also the *mobile* Green's function singularity located at an observation point that varies as the testing integral is evaluated. The singularities along the cell edges and at the cell corner may be mitigated by an appropriate sequence of two (or three) transformations of the integration variables. However, the "first" transformation modifies the source integral domain and enlarges the near-self region of the integral. The same technique can be extended to treat the classic MoM source integrals on curved or distorted cells where one has to deal only with the Green's kernel singularity.

The presentation will describe the details of the transformations used to cancel the edge, corner and Green's singularities and provide representative numerical results.