

## On the Use of Differential Equations of Nonentire Order to Generate Entire Domain Basis Functions with Edge Singularity

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Entire domain analytical basis functions with edge singularity are a very useful tool for analysing planar transmission lines and planar rectangular or circular circuits in a moment method solution. Analytical basis functions are limited to separable geometry. In this paper we introduce new entire domain basis functions including edge singularity at the edges of a domain with arbitrary shape. These basis functions are derived from a differential equation of nonentire order which includes a fractional derivative. The one dimensional case is considered first. In the two dimensional case the basis functions are constructed numerically using the boundary element method and the Galerkin method. The basis functions are applied in a moment method solution to analyse a shielded microstrip. The current and the electric field are calculated and compared with the results obtained by analytical basis functions.

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