Partitioned Conduction Modes in Surface Integral Equation-Based Impedance Extraction

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***Abstract*—As integrated circuits operate at increasingly higher speed, methods are needed to handle wideband quasi-static and full wave EM analysis of distributed RLC impedances for package and on-chip interconnects. One particular solver that is capable of this type of analysis is a surface-based integral solver called FastImp. This talk will present a method that addresses many issues currently plaguing FastImp. A significant shortcoming of FastImp is its lack of a single uniform approach to model contact current over a wide range of frequencies. In addition, FastImp's handling of contact current at high frequencies cannot optimally and efficiently capture skin effects and proximity effects while its handling of contact current at low frequencies lacks accuracy due to its use of a centroid-collocation scheme.**

The method discussed in this talk addresses the above difficulties by offering a unified mean of computing contact current over a wide range of frequencies. It will be shown that the electric field on the conductor contact surfaces can be modeled accurately and efficiently by only a few "partitioned" surface-based conduction modes as basis functions. The electric field on the non-contact surface of the conductor is modeled by a set of standard piecewise constant basis functions. The conduction mode basis functions, used in a Galerkin technique, and the piecewise constant basis functions, used in a collocation scheme, are utilized for the discretization of the integral formulation in FastImp. Examples will demonstrate the improvements on accuracy, efficiency and consistency of our method.

[Full Text Not Available]