On the calculation of spectral Green's functions of layered media by means of Jost solutions

The level of computational savings which are attainable obviously depends in large order on how well the approximate current solution fits the actual surface current behaviour. In regions where the approximate solution is a poor match the low order expansions will give correspondingly poor results forcing us to use a higher order expansion.
However, rather than implement a higher order version of the algorithm globally the paper will explore an adaptive procedure where low order polynomial expansions are utilized in areas of the scatterer where it is expected that the asymptotic solution will yield good results and higher order expansions to be used in regions where we expect the asymptotic solutions not to capture the current behaviour so accurately (near corners for example). In this fashion we can devise a methodology which is as numerically intensive as standard AWE only in regions where it has to be.
The paper will present a variety of numerical results illustrating the application of the algorithm to a variety of a variety of canonical scattering bodies such as polygons and wedges.

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On the calculation of spectral Green′s functions of layered media by means of Jost solutions

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Abstract. The design of integrated circuits becomes ever more demanding due to various factors such as substantial increases in frequency and bandwidth and growing requirements regarding functionality and reliability, low-power consumption and small size. Along with the increase in complexity comes the need for more accurate modelling of both active and passive components. In this paper we consider the modelling of passive structures with an emphasis on multi-layer piece wise homogenous stratified substrates. We aim at analysing passive structures by means of a full-wave 3-D boundary integral equation for the determination of the electromagnetic fields. This approach requires the Green′s functions of the substrate.
We show an efficient method to calculate the Green′s functions in the transverse spectral domain by forming a linearly independent set of so-called Jost solutions. The method is especially expedient for configurations with many layers and many different source and observer locations within the layered substrate. The Jost solutions are determined via the numerical stable scattering matrix formalism. The computational cost is proportional to the number of layers, N, whereas a direct calculation with scattering matrices would require order N 2 operations. The solutions form a basis

for the solution of the Green's functions associated with arbitrary source and observer levels within the substrate.

The method is investigated for a configuration which consists of a multi-layer substrate located beneath a microstrip line that carries an induced current density which matches an approximate quasi-static solution. A more complicated problem consists of an arbitrary shaped passive component made of metal that has finite thickness and may be lossy. For this problem a 3D full-wave time-harmonic boundary integral (BIE) seems to be the best possible candidate. The configuration is decomposed into two disjoint domains, viz. the substrate which forms the host domain and the complementary domain formed by the conductors. Following the formulation of Jones [1] a BIE of the second kind can be derived which has a compact perturbation on the identity and can be solved uniquely. To solve the BIE a triangulation of the boundary and the application of a method of moment analysis with Rao-Wilton-Glisson expansion and testing functions provides sufficient flexibility in the layout.

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Interconnection modeling challenges in System-in-Package (SiP) design

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Abstract. The possibility to combine multiple functionalities in one electronic device is directly related to the possibility of integrating more electronic components into a unique system. From the technological point of view there are two alternatives: integration at the level of the semiconductor in order to build a system-on-chip (SoC), or integration at package level in order to obtain the system-in-package (SiP). The SiP alternative, which consists in integrating various components (semiconductor devices, resistors, inductors, capacitors, sensors, antennas, etc.) using advanced printed circuit technologies, requires less development time and resources compared with the ones needed for SoC implementation. This has not only the advantage of reduced costs, but gives the possibility to implement in a very short time various functionalities in different models, facilitating the customization of the product, making possible to satisfy specific requests, thus widening the market opportunities of a given product.

The high integration achieved in SiP technologies creates a highly dense three-dimensional circuit, in which active semiconductor devices are interconnected between them and with the external world using a web of thin conductors and embedded passives. The choice of using embedded passives technologies in SiP was dictated by two necessities. The first one regards the impossibility to obtain good passives, especially inductors, on semiconductor substrates, while many materials with very good electrical and high frequency properties are available for printed circuit technologies. The second necessity arises from the continuous increment in number of passives required by the new semiconductor devices (for example a Pentium IV requires approximately 550 passives, and a PC motherboard can arrive to have more than 2300 passives), combined with the need to shrink the