Abstracts

Advanced microwave modeling framework exploiting automatic model generation, knowledge neural networks and space mapping

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In this paper, we propose an efficient Knowledge based Automatic Model Generation (KAMG) technique, aimed at generating microwave neural models of highest possible accuracy using fewest accurate data. The technique is comprehensively derived to integrate three distinct powerful concepts, namely, automatic model generation, knowledge neural networks and space mapping. We utilize two types of data generators - fine data generators that are accurate and slow (e.g., CPU-intensive 3D-EM simulators); coarse data generators that are approximate and fast (e.g., inexpensive 2D-EM). Motivated by the space-mapping concept, the KAMG utilizes extensive approximate data but fewest accurate data to generate neural models that accurately match fine data. Our formulation exploits a variety of knowledge network architectures to facilitate reinforced neural network learning from both coarse and fine data. During neural model generation by KAMG both coarse and fine data generators are automatically driven using adaptive sampling. The proposed technique is demonstrated through examples of MOSFET, and embedded passives used in multi-layer PCBs.

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