Abstracts

Global electrothermal CAD of complex nonlinear 3-D systems based on a fully physical time-dependent compact thermal model

W. Batty, C.E. Christoffersen, S. David, A.J. Panks, R.G. Joknson, C.M. Snowden and M.B. Steer. "Global electrothermal CAD of complex nonlinear 3-D systems based on a fully physical time-dependent compact thermal model." 2001 MTT-S International Microwave Symposium Digest 01.2 (2001 Vol. II [MWSYM]): 667-670 vol.2.

An original spectral domain decomposition approach is presented for the time-dependent thermal modelling of complex, nonlinear, 3-dimensional systems. This fully analytical approach immediately gives rise to compact models of nonlinear distributed thermal subsystems, without requiring approximation by a lumped element RC network, or nodal reduction. In combination with any thermally self-consistent models of analogue, digital, RF and microwave, microelectromechanical or photonic devices, it supplies a CAD timescale description of mutual thermal interaction between power dissipating and temperature sensitive elements. It therefore has the potential for thermal description of the whole system-in-package. In combination with microwave circuit simulator, Transim (NCSU), the thermal model is applied to the self-consistent global electrothermal harmonic balance simulation of a spatial power combining power FET array. The model is validated by comparison of electrothermal simulation of a power HEMT against experimentally obtained thermal images.

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