

On the Effect of Bilateral Dispersion in Inhomogeneous Symmetrical Condensed Node Modeling

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We have detected bilateral dispersion in electro-magnetic simulation of microwave circuits, based on the SCN modeling. Bilateral dispersion means that in eigenvalue analysis the calculated resonant frequencies may be overestimates as well as underestimates. We demonstrate that this effect is caused by nodal stubs representing inhomogeneous permittivity and permeability in the SCN. We introduce an exact analytic formula evaluating the SCN dispersion errors within arbitrary media, and we verify this formula by means of computational examples. We show that superiority of the SCN modeling (with respect to the ExpN modeling of the same cell size) in terms of the dispersion as exhibited for homogeneous circuits, may practically vanish in the case of inhomogeneous circuits with big differences in media parameters. This effect should be taken into account when selecting one of the models for electromagnetic simulation.

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