Abstracts

The method of envelope currents for rapid simulation of weakly nonlinear communications circuits

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The method of envelope currents is introduced as an efficient tool for simulation of circuits in weakly nonlinear operating regimes. The approach is aimed at spectral regrowth analyses of circuits excited by narrowband-modulated digital carriers. Starting from the method of nonlinear currents, and using the condition of narrowband excitation, we show that circuit equations reduce to systems of linear ordinary differential equations in the complex envelopes of the node voltages. Time-integration of the resulting equations reduces to a sequence of solutions of sparse triangular systems, and is therefore very efficient. The paper concludes with a circuit example.

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