

On Analog Circuit Parameter Estimation

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Abstract— Our paper presents a new method to estimate the analog circuit parameters based on some measurements performed on the real circuit, the parameters of interest being those which are difficult or impossible to be measured directly. Starting from the equivalent scheme of an analog circuit in sinusoidal behavior, we generate the network function in full symbolic form, obtaining an appropriate frequency space representation based on the complex or Laplace modified nodal equations. The magnitude and the phase of the complex transfer function can be measured by supplying the circuit with a variable frequency sinusoidal voltage. Using the measured parameters as reference and the symbolic transfer function computed before, the model parameters of interest are obtained by an iterative identification algorithm based on Output Error method. In this paper are defined two new objective functions which can be minimized using one of the *fminimax* or *fminunc* functions from the Matlab toolbox. Both algorithms are based on iterative computation starting from certain initial values, being efficient for less than four estimated parameters. The algorithms are suitable for linear circuits, as well as for small-signal nonlinear circuits. Finally, the proposed estimation techniques were tested and validated on simulation data on an illustrative example.