

## FASTHENRY: A Multipole-Accelerated 3-D Inductance Extraction Program

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*M. Kamon, M.J. Tsuk and J.K. White. "FASTHENRY: A Multipole-Accelerated 3-D Inductance Extraction Program." 1994 Transactions on Microwave Theory and Techniques 42.9 (Sep. 1994, Part II [T-MTT]): 1750-1758.*

A mesh analysis equation formulation technique combined with a multipole-accelerated Generalized Minimal Residual (GMRES) matrix solution algorithm is used to compute the 3-D frequency dependent inductances and resistances in nearly order  $n$  time and memory where  $n$  is the number of volume-filaments. The mathematical formulation and numerical solution are discussed, including two types of preconditioners for the GMRES algorithm. Results from examples are given to demonstrate that the multipole acceleration can reduce required computation time and memory by more than an order of magnitude for realistic integrated circuit packaging problems.

 [Return to main document.](#)