



## Validate Spice models before use

**I** WAS DISCUSSING THE PROS AND CONS of using Spice as an analytical tool with some analog-design engineers at a recent conference. The consensus was that vendors have improved their implementation of Spice such that the program is now usable for any engineer who can

check out the dc conditions. The biggest problems that Spice analysis has faced and still incurs are the models. Spice vendors don't verify the performance of IC models; they may ensure that a series of models functions with their program, but they never check accuracy.

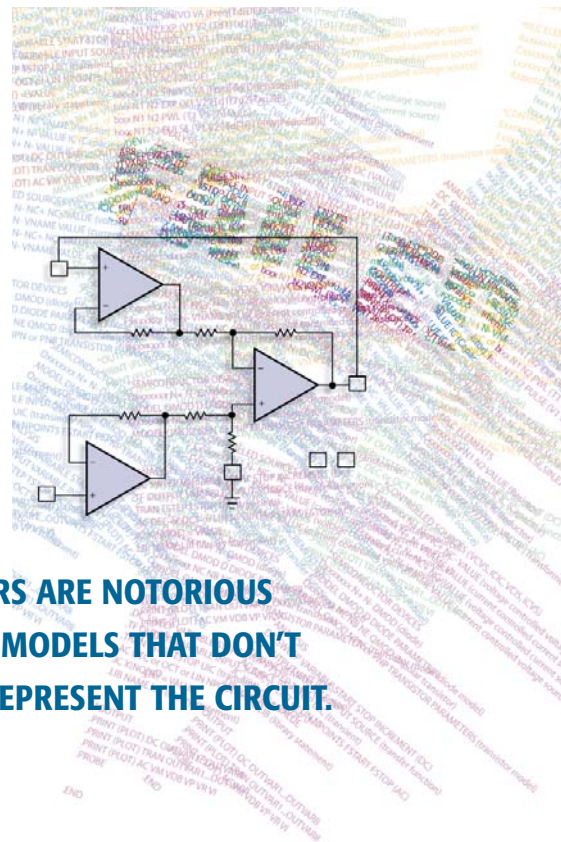
Semiconductor vendors are notorious for handing out Spice models that don't work or that fail to represent the circuit. My Jan 16, 1997, *EDN* article, "Don't count on your Spice models until you validate them," provides an in-depth analysis of the Spice models available at that time. That article shows that the performance of some Spice models has no relationship to corresponding IC performance. When I researched that article, I found Spice models that had twice the IC bandwidth, some with unrealizable gain/frequency curves and some with more problems than solutions. The semiconductor companies that refused to take responsibility for the models they generated exacerbated the poor model situation. Their response to a request for help with the models sounded like the whine of a cheap 10-kW generator as they attempted to push the cause of the poor performance back to the Spice vendor. This scenario was a lose-lose situation, so I recommended using Spice as a last resort.

Today, most semiconductor companies take models seriously, and, as a group, today's Spice models are head and shoulders above

those available in 1997. Furthermore, semiconductor companies are starting to hand out limited-capability copies of Spice programs that include Spice models. This handout seems like a great freebie until you search the Web and find out that at least 10 free versions of Spice are available. The semiconductor companies are handing out the freebies to get designers hooked on designing with their ICs because the Spice programs and models work together the first time, all the time. Spice-model/program compatibility is critical because for the first time, designers have one source for answers to questions.

Spice designs ICs with an IC designer's help, and not every IC works the first time. Thus, engi-

designers use, which results in an accuracy loss in the development of the models that the semiconductor companies distribute. I evaluated new models from several vendors, and, although a definite improvement exists in the models, a lot of errors also exist. All Spice users must evaluate the models they use to determine what error components they are willing to live with, which will be the subject of my next column. □



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neers must assume that the modeling process has inherent errors that they can never eliminate. IC designers use workstations and powerful computers to simulate IC designs, and the average analog designer lacks the time or resources to complete an analysis with these design tools. So, the analog designer must use a simulated model or macromodel. The macromodels are less accurate than those that semiconductor

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