Re: TC1025 comparator spice model

Source: http://sci.tech−archive.net/Archive/sci.electronics.cad/2005−01/0015.html

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From: Mike Engelhardt (*nospam_at_spam.org*)
Date: 12/31/04

Date: Fri, 31 Dec 2004 20:06:58 GMT

Jim,

>>> Hi Great One Jim,
>>>
>>> Looks fine. Now add power supply CURRENTS ;−)
>>>
>>> Thank you.
>>> Could you show me how to do that please?
>>
>> You might just use the LTspice device "1pole".
>> It's a behavioral opamp with a tanh() xfer
>> function. Using the rail−to−rail opamp without
>> feedback approximates a comparator. The 1pole
>> does steer current from the supplies to the
>> output. Also, the 1pole uses the tanh() xfer
>> function that's part of an intrinsic SPICE
>> device that knows how to help the solver find
>> the solution with higher than just the 1st
>> order information that's usually available to
>> the solver's Newton iteration. The behavioral
>> modeling like Jim's is using can't do that.
>>
> Tanh works just ducky in PSpice, or anywhere
> else for that matter...it allows bounding
> without discontinuities.

Yes, it can run "just ducky" in simple simulations. But as the complexity increases, especially if the behavioral devices are found in feedback loops, you've have a progressively more difficult time with convergence problems when using a function like atanh() as a behavioral expression as contrasted with using it as part of a properly written intrinsic SPICE device.

There's a difference between using a transcendental like tanh() in an intrinsic

device and using it in a behavioral expression. When implemented in an intrinsic device; almost any SPICE, at least both PSpice and LTspice; is aware of how to fix problems that arise in the Newton iteration method. Newton−Raphson is a 1st order method that can run into trouble finding the solution of multi−dimensional non−inear systems like circuits. The types of techniques used in intrinsic SPICE devices like semiconductors can't be applied to general behavioral expressions using atanh().

−−Mike