

Nonlinear Convergence Problems for Curtice Models

Problem

Nonlinear convergence problems for Curtice models.

Solution

A nonlinear model having convergence problems may be due to a poor nonlinear model.

For the Curtice cubic model, it is possible to have I_{ds} and $g_m = 0$ for different values of v_{gs} .

In order to get proper convergence, both I_{ds} and g_m need to $=0$ for the same value of v_{gs} .

The attached spreadsheet lets you see if a model will have any convergence problems by entering in the polynomial coefficients. From the graphs, it is easy to see if I_{ds} and $g_m = 0$ at the ~same value of v_{gs} . If I_{ds} & g_m do not equal zero for the same value of v_{gs} , then you can try to find a new model, adjust the polynomial coefficients, or try to get the manufacturer to change the model.

The attached white paper gives more information on the model and its operation in Microwave Office. Based on the attached referenced paper by Dr. Steve Maas, a warning message may appear telling the user about a FIXUP taken:

Warning: Model does not pinch off properly; standard fixup taken"

This fixup causes the A1 parameter value not be computed in the model. Consequently, small signal values may turn out to be different than the values resulting from ADS model.

There is a switch that enables/disables this FIXUP parameter. By default FIXUP is enabled. The user may elect to disable FIXUP, however, convergence issues may appear due to some inadequate polynomial values (A0, A1, etc). A benefit of disabling FIXUP is that simulation results will now have better correlation with those of ADS model, assuming the model converges. To enable/ disable the A1 parameter, double click on the Curtice Cubic Element to bring up its properties, click on Show Secondary in the bottom right hand corner of the dialog and scroll down to the bottom of the resulting list.

Element Options: CURTICE3 - Curtice Cubic Nonlinear FET Model Properties (Showing 47 of 47)

Parameters User Attributes Symbol Layout Model Options

Yield

Name	Value	Unit	Tune	Optimize	Constrain	Lower	Upper	Step Size	Hide	Hide Label	Description
RS	0.001	Ohm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Source resistance
RIN	0.001	Ohm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Intrinsic resistance
CGSO	0	pF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Gate-source capacitance at 0V
CGDO	0	pF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Gate-drain capacitance at 0V
FC	0.5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Gate-capacitance linearization parameter
CDS	0	pF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Drain-source capacitance
CGS	0	pF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Fixed gate-source capacitance
CGD	0	pF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Fixed gate-drain capacitance
TNOM	26.85	DegC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature
LAMBDA	0		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	DC drain-source resistance parameter
RGD	0.001	Ohm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Gate-drain resistance
RDSO	1000000	Ohm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Constant drain-source resistance
LG	0	nH	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Gate inductance
LS	0	nH	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Source inductance
LD	0	nH	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Drain inductance
P	2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Noise par: P
Tg	16.85	DegC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Noise par: gate noise temp
KF	0		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Flicker noise coefficient
AF	1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Flicker noise exponent
FFE	1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Flicker noise freq. exponent
NFLAG	AWR1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Noise model
AFAC	1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	Gate-width scale factor (for COMPAT=AWR)
NETNG	1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	Number of gate fingers scale factor
FIXUP	enable		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	disable/enable standard fixup
COMPAT	AWR		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	Compatibility selector
TYPE	N-channel		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	Device type

Device ID

☒ Enable ☐ Freeze ☐ Hide Name ☐ Bold Name Part Number:

OK Cancel Help Element Help Vendor Help

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