

Exponential current source

iexp

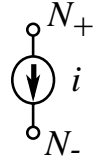


Figure 1: Independent Current Source Element.

Form:

`iexp:(instance name) n1 n2 (parameter list)`

`n1` is the positive element node,

`n2` is the negative element node.

Parameters:

Parameter	Type	Default value	Required?
i1: Initial value (A)	DOUBLE	0	no
i2: Final current (A)	DOUBLE	0	no
tdr: Rise Time delay (s)	DOUBLE	0	no
tdf: Fall Time delay (s)	DOUBLE	0	no
tcr: Rise Time Constant (s)	DOUBLE	0	no
tcf: Fall Time Constant (s)	DOUBLE	0	no

Example:

`iexp:isignal 8 0 i1=0.1 i2=0.8 tdr=1 tdf=2 tcr=0.35 tcf=1`

Description:

The exponential transient is a single-shot event specifying two exponentials. The current is i_1 for the first t_{dr} seconds at which it begins increasing exponentially towards i_2 with a time constant of t_{cr} seconds. At time t_{df} the current exponentially decays towards i_1 with a time constant of t_{cf} . That is, The waveform shape of an exponential current source is given by

$$i_1 \quad 0 < t \leq t_{d1} \quad (1)$$

$$i_1 + (i_2 - i_1)[1 - e^{-(t-t_{dr})/t_{cr}}] \quad t_{d1} < t \leq t_{d2} \quad (2)$$

$$i_1 + (i_2 - i_1)[1 - e^{-(t_{df}-t_{dr})/t_{cr}}]e^{-(t-t_{df})/t_{cf}} \quad t_{d2} < t \leq t_{stop} \quad (3)$$

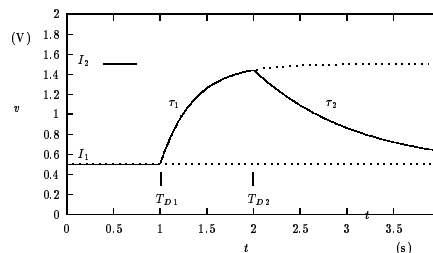


Figure 2: Current source transient exponential waveform for `iexp:isignal 8 0 i1=0.1 i2=0.8 tdr=1 tdf=2 tcr=0.35 tcf=1`


Notes:

This is the I element in the SPICE compatible netlist.

Version:

2002.05.15

Credits:

Name	Affiliation	Date	Links
Satish Uppathil	NC State University	May 2002	
svuppath@eos.ncsu.edu			www.ncsu.edu