xfer_fn.xbe

Attributes

```
xbe name=xfer_fn integrate=yes
#
#
# generic xfer function (up to order 5)
# This file does not have the actual implementation.
# It will only serve as a block in the GSEIM GUI.
# The GUI python parser will process it and include
# suitable filter elements in the circuit file.
#
#     a0 + a1*s + a2*s^2 + a3*s^3 + a4*s^4 + a5*s^5
# y = ---------------------------------------------  x
#     b0 + b1*s + b2*s^2 + b3*s^3 + b4*s^4 + b5*s^5
#
#
#
Jacobian: constant
input_vars: x
output_vars: y
aux_vars:
iparms: scale_coef=0
sparms:
rparms:
+  a0=0  a1=0  a2=0  a3=0  a4=0  a5=0
+  b0=0  b1=0  b2=0  b3=0  b4=0  b5=0
+  f0=0
stparms:
+  y_sv=0
igparms:
outparms:
```

Description

`xfer_fn.xbe` satisfies the s-domain relationship,

$$y(s) = \frac{a_0 + a_1\, s + a_2\, s^2 + a_3\, s^3 + a_4\, s^4 + a_5\, s^5}{b_0 + b_1\, s + b_2\, s^2 + b_3\, s^3 + b_4\, s^4 + b_5\, s^5}\, x(s)\,.$$

Filters of order 1 to 5 can be implemented with `xfer_fn.xbe`. For example, a first-order low-pass filter can be implemented by making the coefficients a_1, a_2, a_3, a_4, a_5, b_2, b_3, b_4, b_5 equal to zero. The order of the numerator must less than or equal to the order of the denominator.

If `scale_coef` is set to 1, the coefficients given by the user are scaled. The scaling is based on the following assumptions.

(a) The user has designed the filter for a corner frequency $\omega = 1$ rad/s, i.e., $f = \dfrac{1}{2\,\pi}$ Hz.

(b) The new corner frequency is specified by the user (in Hz) using the `f0` parameter.

If `scale_coef` is set to 0, the coefficients given by the user are not scaled.