filter_1.xbe

Attributes

```
xbe name=filter_1 integrate=yes
#
# generic filter (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

filter_1.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 filter_1.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.