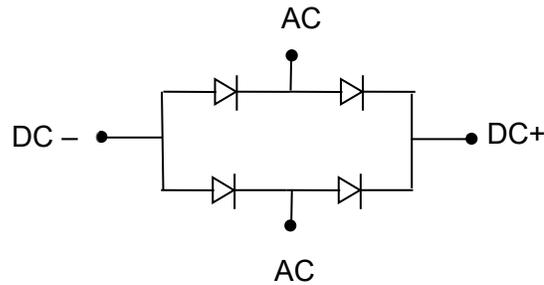*Sage Model Notes*

DiodeBridge.stl

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A model for a diode bridge circuit that rectifies AC voltage to DC voltage, using the diode component introduced in Sage version 12.
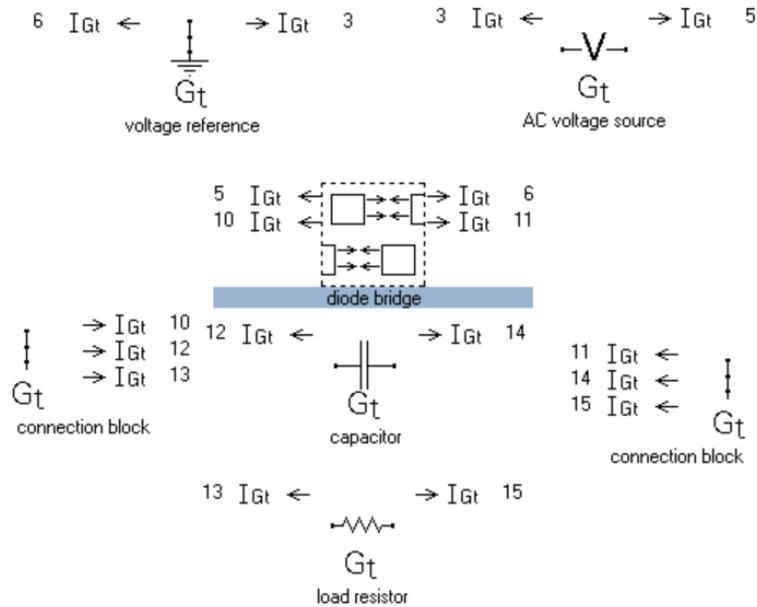
In conventional electrical circuit notation a diode bridge looks like this:

In the Sage model the diode bridged is created from diode and connection block components like this:
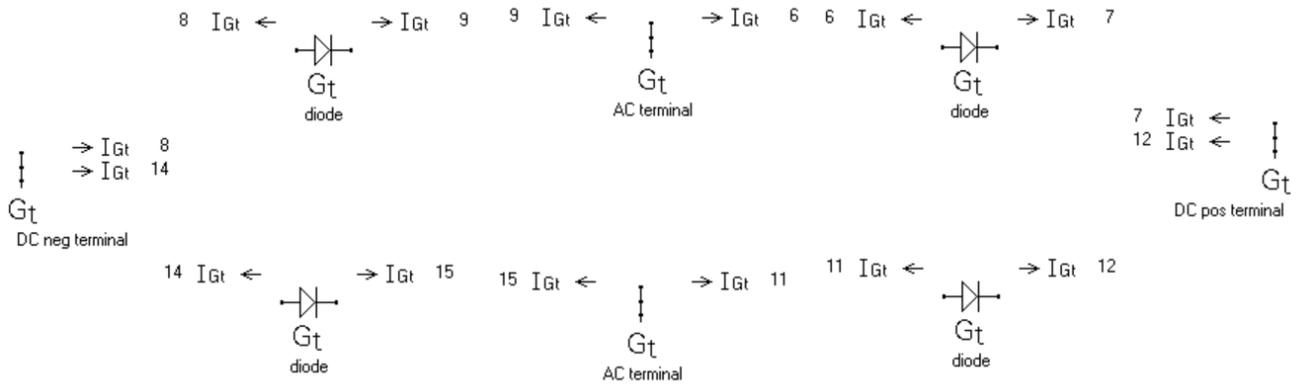
All the above are packaged within a submodel visible as the highlighted component of the root model below:

The upper two connectors of the diode bridge submodel are the AC terminals, connected to the AC voltage source, and the lower two the DC terminals, connected to the capacitor and load resistor in parallel. The submodel defines inputs that override the inputs of all the diode components so you can set them all at the same time:
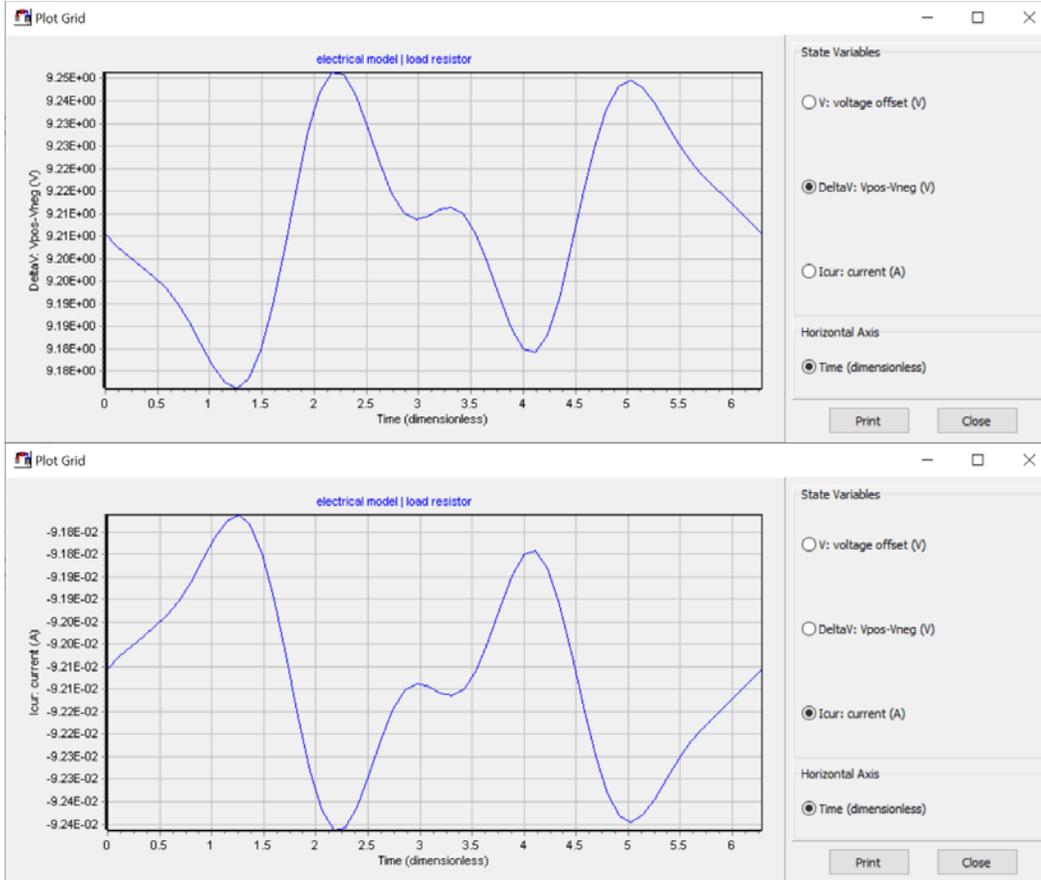
Inputs

Rf	forward resistance diodes (Ohm)	1.000E-01
Rr	reverse resistance diodes (Ohm)	1.000E+06
Is	saturation current diodes (A)	-1.000E-04

You can change the polarity of the DC terminals by changing the sign of the `Is` input.

2

The capacitor component smooths DC output voltage so that a nearly constant DC current with some ripple flows through the load resistor. The DC voltage drop and current waveforms through the load resistor are shown below:

Load Resistor voltage-drop and current

Note from the scale that these are both essentially DC values with about 0.4% ripple amplitude.

NTnode To resolve the higher harmonics in the voltage and current solutions the root-model input NTnode is higher than usual. The current value is

```
NTnode          number time nodes                    11
```

This should suffice for most purposes but can be increased if necessary. For models with more sinusoidal solution variables NTnode = 7 is generally sufficient. Odd values are recommended for numerical reasons and beware that solution time increases rapidly with increasing NTnode.