Ideal Current Controlled Voltage Source VTB Model

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Model name: CCVS
DLL name: CCVS_030808
Version number: 1.1
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Pictorial Representation of Model

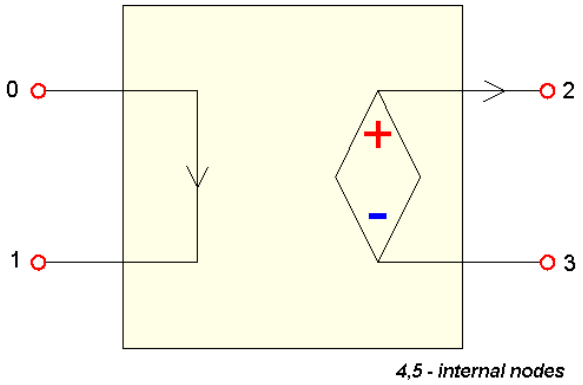

Figure 1. Pictorial representation

Brief Description of Model

The model represents an ideal CCVS with gain factor.

Model Validity Range and Limitations

None.

List of Model Pins with Connectivity Information

Pin Designation	Description
Terminal 0 & terminal 1	Input connectors
Terminal 2 & terminal 3	Output connectors

List of Parameters and Output Variables

This is a complete list of all parameters of the model. All models use SI units.

Parameter Name	Description	Default Value	Units
Gain	Gain factor	1	Ohms

This is a list of output variables.

Variable Name	Description	Units
Output Current	Output current by figure 1	Amperes
Output Voltage	Output voltage equals v_2-v_3	Volts
Input Current	Input current by figure 1	Amperes

Assumptions in Model Derivation

The model is ideal element.

Mathematical Description of Model

The model is based on the equations:

$V_0 - V_1 = 0$;
$V_2 - V_3 - r*I = 0$
The RC model form is

$$\begin{bmatrix} 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & -1 \\ 1 & -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & -1 & -r & 0 \end{bmatrix} \begin{bmatrix} v_0 \\ v_1 \\ v_2 \\ v_3 \\ I_1 \\ I_2 \end{bmatrix} = \begin{bmatrix} i_0 \\ i_1 \\ i_2 \\ i_3 \\ 0 \\ 0 \end{bmatrix}, \qquad \text{where} \quad I_1 = i_0; \quad I_2 = i_2;$$

Example of Model Use

Example is shown in fig.2. This is a test problem. Gain factor equals 2 [Ohms].

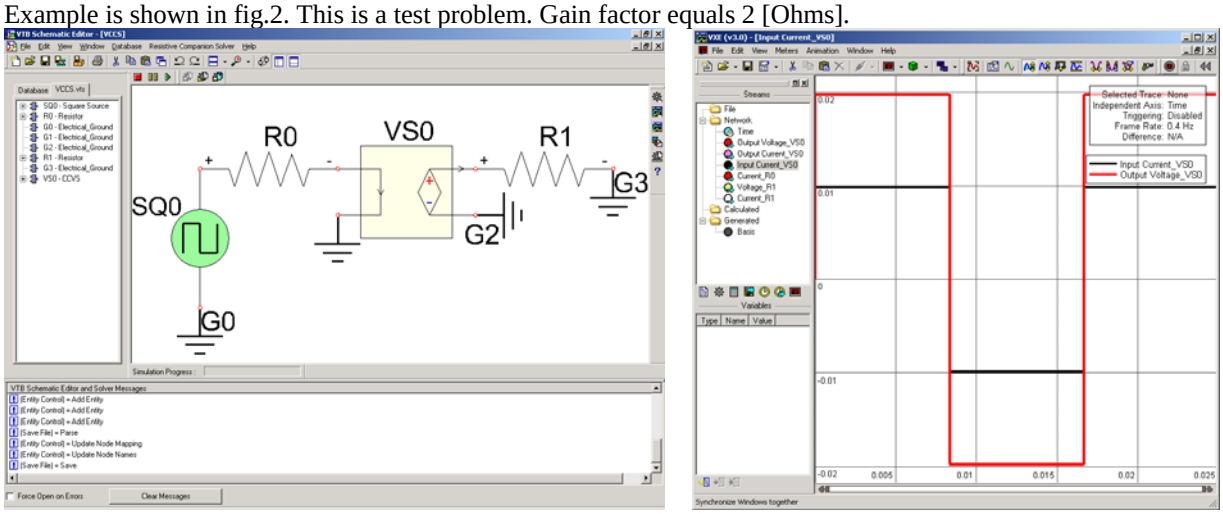

Figure 2. Example of model use

Model Validation

Model was validated by comparing VTB results and analytic solution.

References

J.Vlach, K.Singhal Computer Methods For Circuit Analysis And Design, NY, 1983.