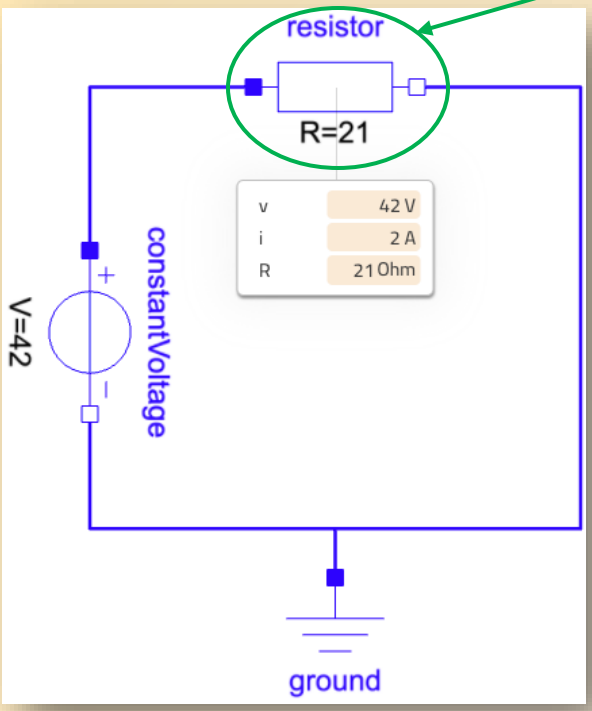
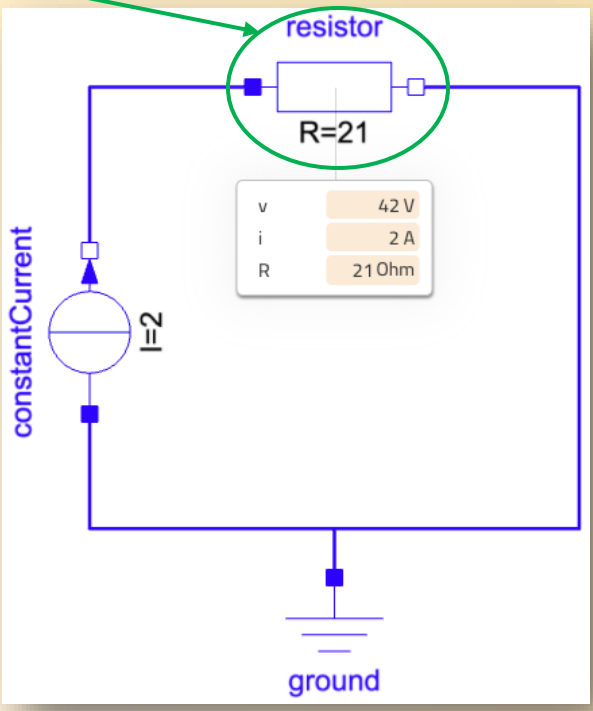
Acausality

A single component for all causalities

Conductor — Same model — Resistor





The resistance *R* is set
The voltage *v* is known
→ The current *i* is the solved for

The resistance *R* is set
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→ The voltage *v* is the solved

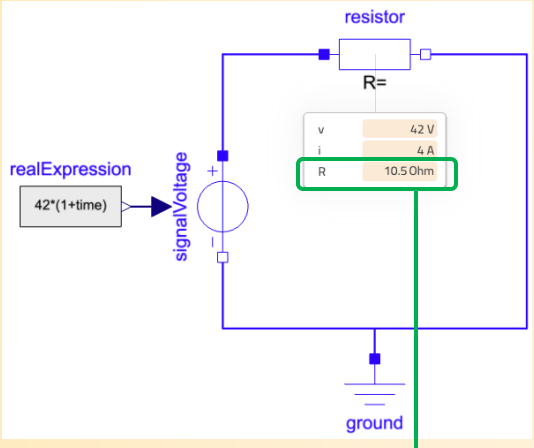
The resistor illustrates well the principle of acausality.
And it is true for all models.
It does not mean that all causalities are desired –
there are ways to influence the causality selection.

Dr. Clément Coïc

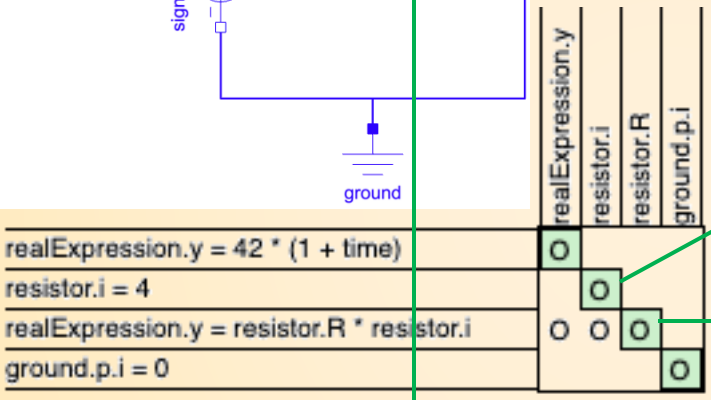
Bi-causality

All variables known to compute the parameter value

In Modelica, a model results in two problems to solve: the initialization problem and the time simulation problem. Here we leverage the former to compute the value of R and reuse the computed value for time simulation.



The current *i* is set as initial equation
The voltage *v* is known
→ The resistance *R* is the solved for

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6 initial equation
7     resistor.i = 4;
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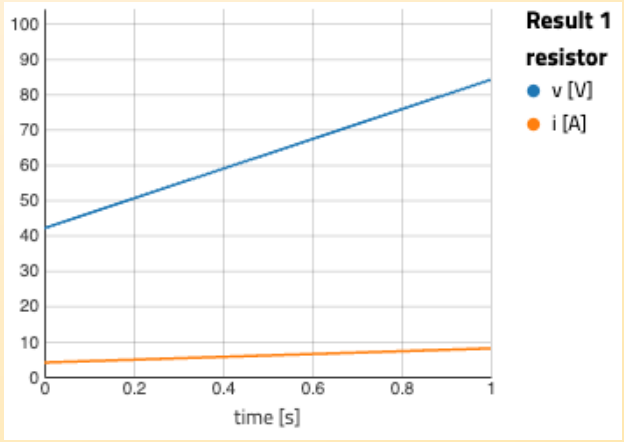
R is the solved for in this equation

For this problem,
R is found to be 10,5 Ohm.

This value is used for the time simulation to determine the value of the current trajectory.



Dr. Clément Coïc