4. Using Wolfram SystemModeler to operate models

This video demonstrates how models can be operated in Mathematica. The video sets out the steps to take to import an electrical model into SystemModeler in order to generate graphs and plots, and offer effective ways of visualising the behaviour of mathematical processes that can be applied to define and explain the physical characteristics of electrical systems.

Transcript

**Colin:** [00:00:18] In this video, we'll look at how to pull up your electronic model, that you built yourself into Mathematica and to be able to generate graphs and plots. So first thing we need to do is we need to type in appropriate code to pull the model in.

**Colin:** [00:00:34] So in this case, similar to what happened to the previous video, we type in SystemModel and square bracket quotes. SystemModel. Square bracket quotes and the name of the model and in this case, our model is called model two. Close quotes, close square brackets and then shift enter to have that work and you can see an image of the model turns up. Now you can type in the appropriate code to enlarge an image if you like. But we'll keep pressing on because we want to do is to start manipulating things.

**Colin:** [00:01:23] So now I'm going to type in show Square bracket SystemModel. And you can see that the commands come up automatically. Square bracket model two. Close the quotes. Finish amy square bracket, there remove any errant spaces and, press shift enter.

**Colin:** [00:02:08] Just make sure that I've got the appropriate number of square brackets I need two there, and Enter. And it shows the model. The next thing we'd like to do is to do a simulation before we can do the simulation. We need to go back to our model. So I'm going to go back to systems model over here and to the simulation in the simulation center. And you'll see it's got a section here called Suggested Plot Variables.

**Colin:** [00:02:39] If we click on those, the model automatically collect data on those particular variables so we've the ramp voltage resisted two. It'll give us the voltage drop across that resistor and resistor one. Also the voltage drop. So now we've got those things clicked. We can go back to our Mathematica sheet. And we can start to pull that data in. So we set up a simulation. This is similar to what we've done before. So sim equals SystemModel simulate, and you'll see that a little context menu turns up and we can just click on that and then we put our square brackets and we put in the name of that model. And you can see that the name turns up automatically. So you can click on that and close up the square brackets and we can press then Shift Enter.

[00:03:46] So now we've got the experiment run and the data is being put into a variable called sim. The next thing we need to do is to plot it. In order to plot it, we write, SystemModel, plot and then we can put in what we need to plot and in this case. It's going to be the simulation itself. And we need to put the curly braces, sorry, square braces this time and we can type in sim.

[00:04:21] And in order for us to get the plot variables that we require, we're going to put a comma in and curly braces and we'll list the variables. And in our case, the variables were and these have be quotes. Resistor one dot v, to give us the voltage drop across the first resistor. And we put a comma. Resistor two dot v, to give us a voltage drop across a second resistor and then we will do then also the ramp voltage one dot v.

[00:05:21] And we have to make sure we put all the quotes around each one of those variables. And close the curly braces and then closed the square brace. Shift enter. You can see that I've got an error message about one of my variables, which was ramp voltage one, and the error was I didn't put an upper case for the voltage, so I correct that and run it. And we have our graph and you can see it gives a display of the values as they change.

[00:06:21] Students can take this as a screenshot and put it into their folio or they can put this simulation as a file, inside an electronic portfolio to show achievement for the SAT project.