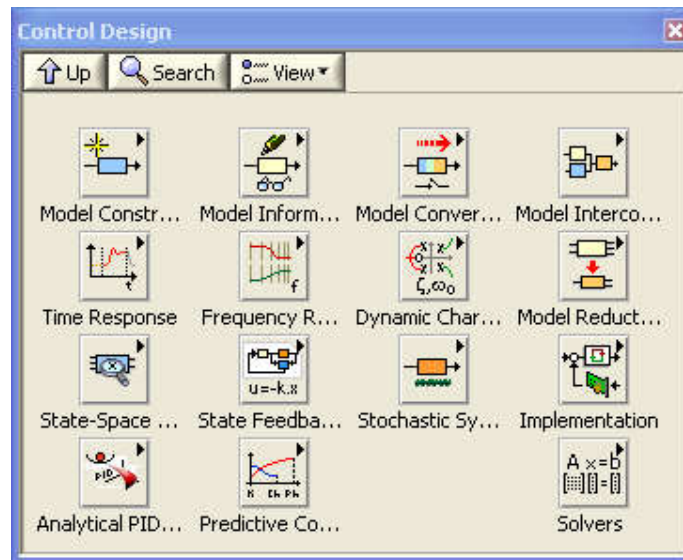


CONTROL AND SIMULATION TOOLS IN LabVIEW

Control Design Palette

Once the Control Design Toolkit is installed, the Control Design palette is available from the Functions palette. The Control Design palette is shown in the figure below.



Creating s-transfer functions. Simulation. Frequency response

The **Model Construction** palette contains several functions for creating models. The resulting model is represented as a cluster. This cluster can be used as input argument to other functions, e.g. for simulation, frequency response analysis, etc.

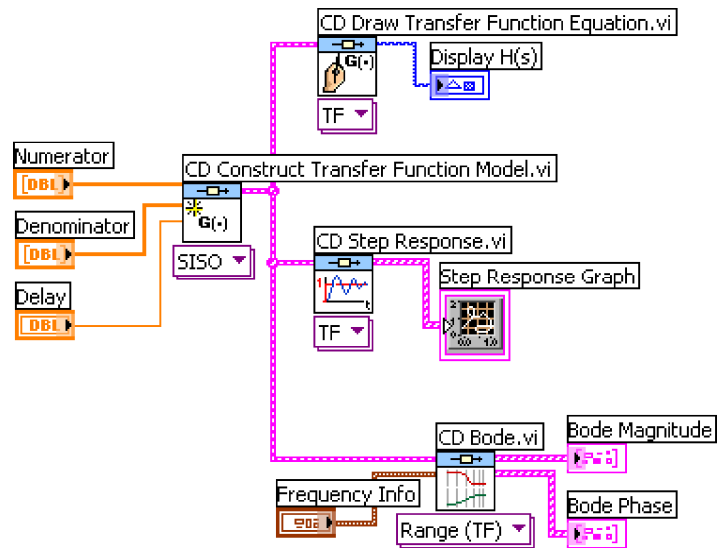
On the **Model Construction** palette there are also functions for displaying the transfer function nicely on the front panel.

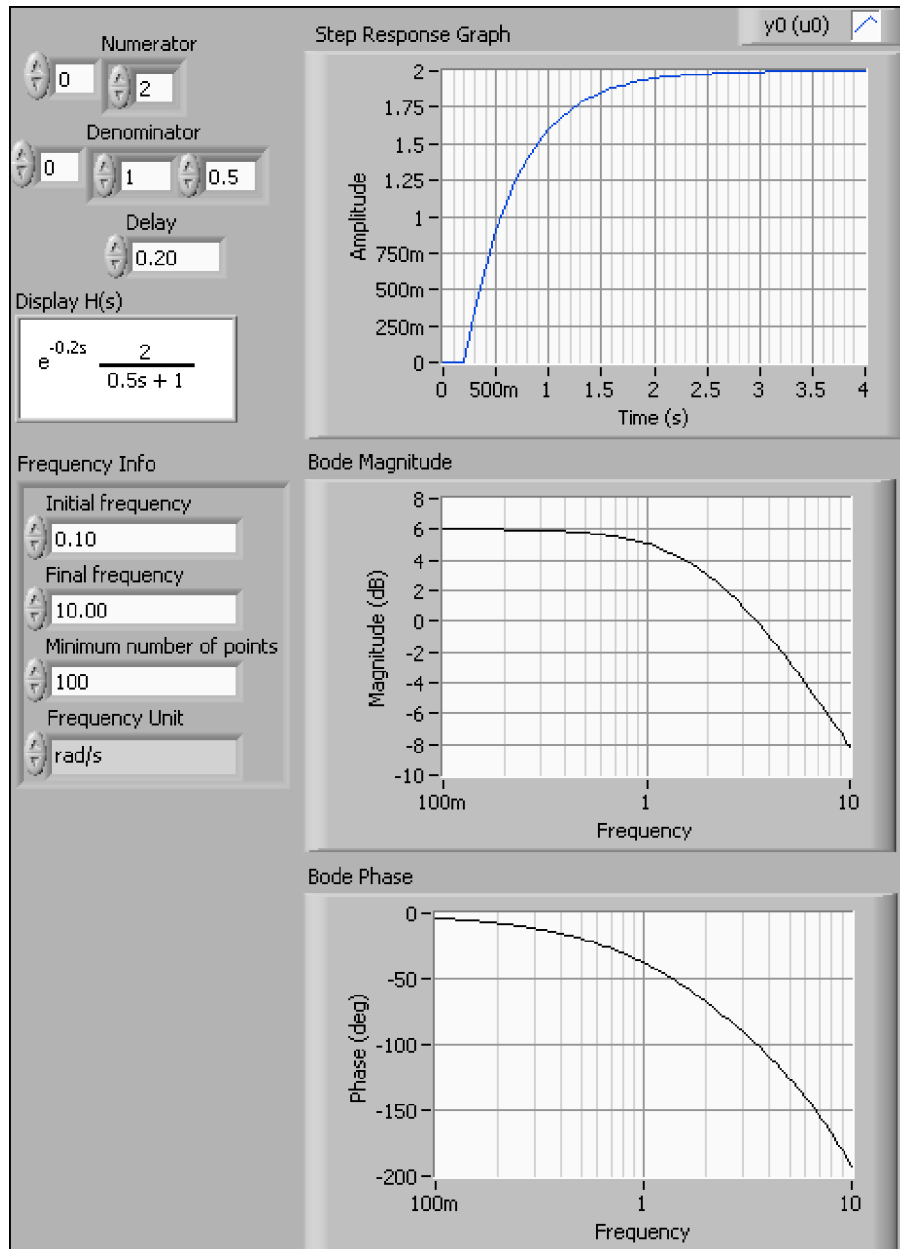
Once the model is created, you can simulate it using functions on the **Time Response** palette, and you can perform analysis, for example frequency response analysis using functions on the **Frequency Response** palette. Note that these simulation and analysis functions can be used on both continuous-time models and discrete-time models.

The VI shown below implements the following:

- The **CD Construct Transfer Function Model** function (CD means Control Design) (on the **Model Construction** palette) defines a transfer function.
- The **CD Draw Transfer Function** function (on the **Model Construction** palette) displays the transfer function nicely in on the front panel (using a picture indicator which can be created by right-clicking on the Equation output of the function).
- The **CD Step Response** function (on the **Time Response** palette) simulated the step response, assuming the input step has amplitude 1.

- The **CD Bode** function (on the **Frequency Response** palette) plots the frequency response in a Bode plot.



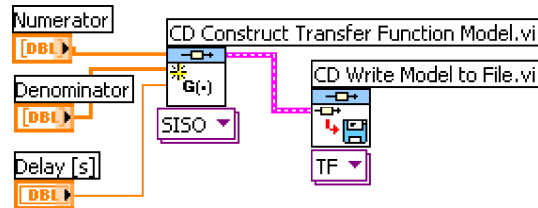
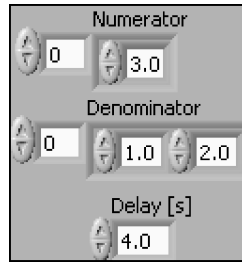


Writing models to file. Reading models from file

Models can be written to a file, and later read from that file, using the **CD Write Model to File** and **CD Read Model from File** functions, respectively.

Example: Writing a transfer function model to a file

The VI shown below shows how to write a transfer function model to a file.

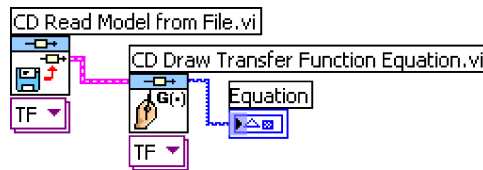
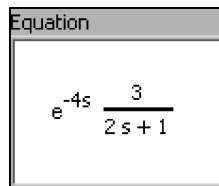


When the **CD Write Model to File** function is executed the usual Save File dialog window appears. (If you have wired a file path to the File Path input of the function, this dialog window is not opened.) You can give the file any name (the file extension does not matter).

A model can be read from a model file using the **CD Read Model from File** function.

Example: Reading a transfer function model from a file

The VI shown below shows how to read a transfer function model from a file.



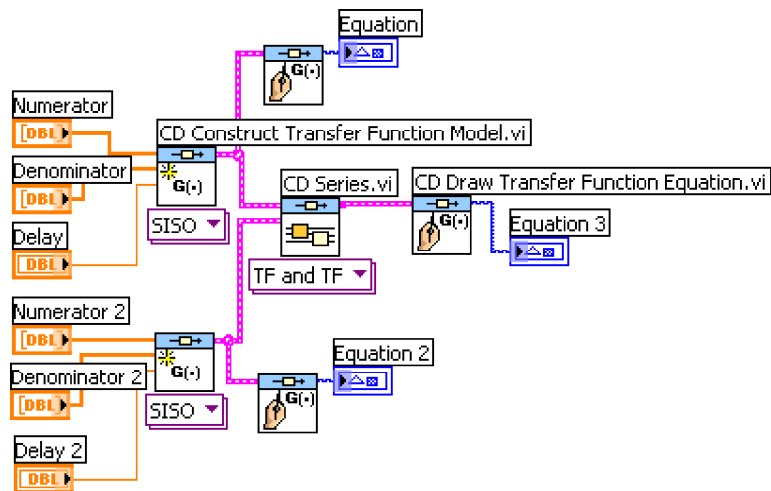
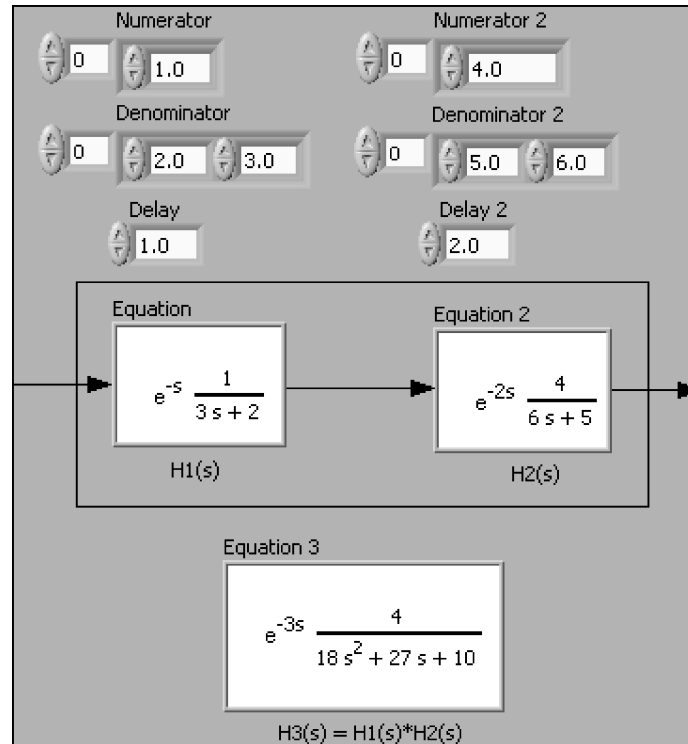
When the **CD Read Model from File** function is executed a File dialog window appears. (If you have wired a file path to the File Path input of the function, this dialog window is not opened.)

Connecting models

The Model Interconnection palette contains several functions for connecting models. Series connection and a feedback connection of transfer functions are described in the following.

Series connection of transfer function models

The VI shown below shows how to get the resulting transfer function of two transfer functions connected in series using the **CD Series** function.



Feedback connection of continuous-time transfer function models

The VI shown below shows how to get the resulting transfer function of two continuous-time transfer functions connected in a feedback loop.

