The test case **RC_cs.fmu** provided in the **tutorial/FMU** subdirectory of **Simcenter Amesim** contains an example of an FMU for Co-simulation. It is the same system as shown in the figure Circuit schematics and equations of the RC FMU, with one input variable, the applied voltage *u*, and one output variable, the measured capacitor voltage *y*. There are two internal variables, the charge *q* and the current *I*, and two parameters, the resistance *R* and capacitance *C*. A forward Euler integrator is embedded in the FMU.

Step One

It is easier to place the FMU in the directory where the associated **Simcenter Amesim** import submodel is to be created (for example in **C:/imported**).

1. Pull-down the **Interfaces > FMU import assistant ...** command.
   This opens the first step of the FMU Import Assistant - choosing the FMU to import (see figure The FMU Import Assistant).
2. Click the **...** button next to the **FMU** field.
3. With the file selection browser, select the **RC_cs.fmu** file, and then fill the **Submodel storage directory** field with the path to the directory where the import submodel is to be created, e.g. **C:\imported** (see figure below).
4. Uncheck the **Submodel name** checkbox to let the assistant automatically choose a name for the submodel, and click the **Next** button to proceed to the next step.

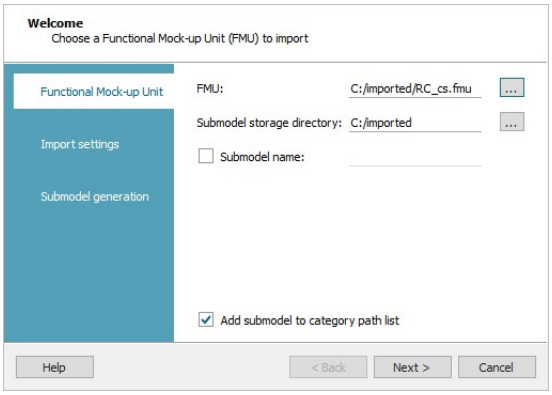


Figure 2-26. The first step of the import assistant

Step Two

The second step of the FMU Import Assistant deals with the import settings (see figure below).

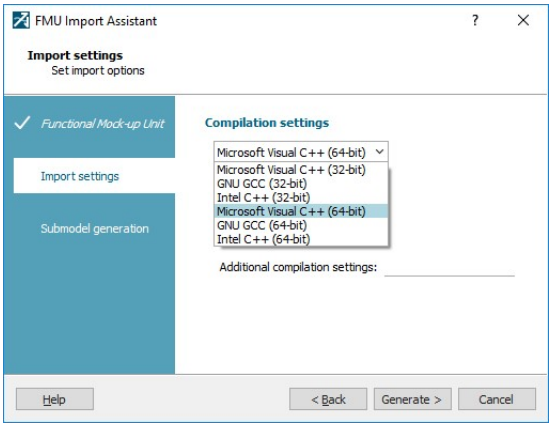


Figure 2-27. The second step of the import assistant

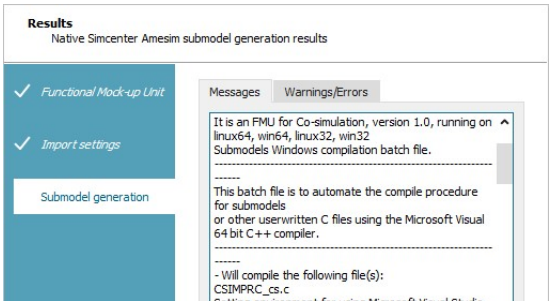
At this step, the compiler used to build the submodel has to be chosen according to the compiler selected in **Simcenter Amesim** to build the model which uses the import submodel. The two compilers have to be chosen consistently.

You can safely ignore the "Preferred simulation type" radio button, since it is only relevant to mixed-type FMUs, i.e. FMUs that have both the Model Exchange and Co-simulation interfaces.

Click the **Generate** button to proceed to the next step of the assistant.

Step Three

This is the last step of the assistant (see figure below).



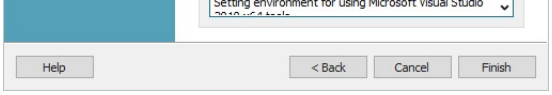


Figure 2-28. The last step of the import assistant

At this step, a new **Simcenter Amesim** library node is created in the current directory, containing an import submodel called **CSIMPRC**(made of a SPE description file and a C source file) which is automatically compiled using the **AMEcc_RELEASE**script.

The library contains an icon called **RC_cs** which was automatically created by the Import Tool. This is a default icon for the FMU component, having one input signal-type variable (the supplied voltage *u*), and one output signal-type variable (the voltage *y*).

A subdirectory with the same name as the FMU (here **RC_cs**) is also created in the current directory, containing the unpacked FMU zip file.

After clicking the **Finish** button, the path to the new library node is automatically added to the **Category Path List** of **Simcenter Amesim**.

Step Four

A test **Simcenter Amesim** model is created in **Sketch mode** by dropping two instances of this icon on the sketch, and providing signal sources as input to the two components, as shown in figure Sketch of the first Simcenter Amesim test model with two instances of the RC icon.

As of this step, the documentation extracted from the FMU can be displayed in the **Help**by right-clicking one of the two icons and choosing **Help...** (see figure Import submodel documentation displayed in the Help).

Step Five

In **Submodel mode**, the **CSIMPRC_cs**submodel is associated with the two icons, as shown in the figure below.

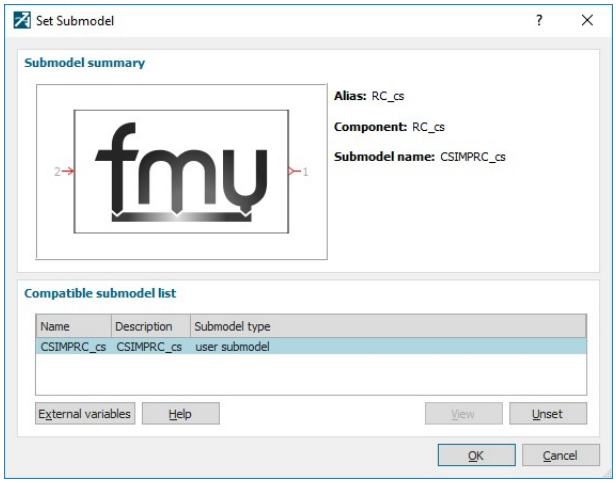


Figure 2-29. Submodel dialog box showing the import submodel

Step Six

In **Parameter mode** (see the figure below), the parameters of the two instances are displayed and their value can be changed.

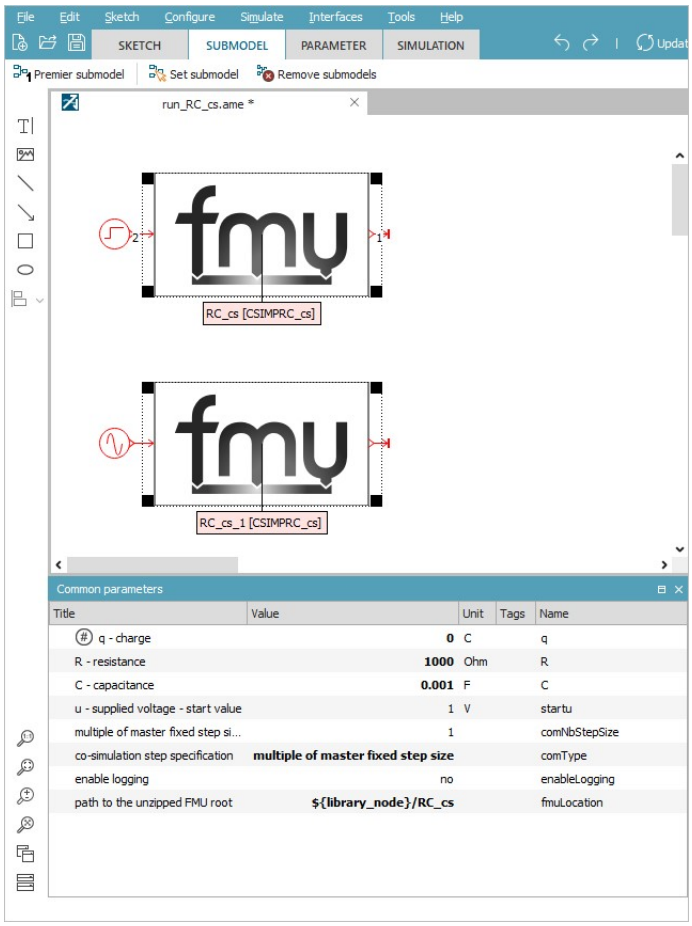


Figure 2-30. Setting the common parameters of the two instances

Figure 2-30. Setting the common parameters of the two instances

In addition to the two physical parameters *R* and *C*, it can be noticed that two parameters called *q* and *startu* are available, corresponding to the start values of the original *q* and *u* variables. The Import Tool also added four parameters that are not related to the variables of the model:

- **enablelogging** is an enumeration taking the values **yes** or **no**. If set to **yes**, the logging messages from the FMU are reported in the simulation log window.
- **fmuLocation** is the path to the unpacked FMU. It is the path to the directory in which the Import Tool previously extracted the content of the FMU.
- **comType** specifies how the co-simulation step size is determined. If set to **multiple of master fixed step size**, the parameter called **comNbStepSize** is used. It is allowed only if a fixed step size solver if selected in the **Run Parameters** of **Simcenter Amesim**. See the *Co-simulation specific parameters* section for the other possible value.
- **comNbStepSize** is displayed if **comType** is set to **multiple of master fixed step size**. The actual co-simulation step size is computed by taking the product of this value with the step size of the numerical integrator.

Step Seven

Since the **comType** parameter is set to **multiple of master fixed step size**, the **Fixed step integrator** has to be selected in the **Run Parameters** dialog box, as shown in the figure below.

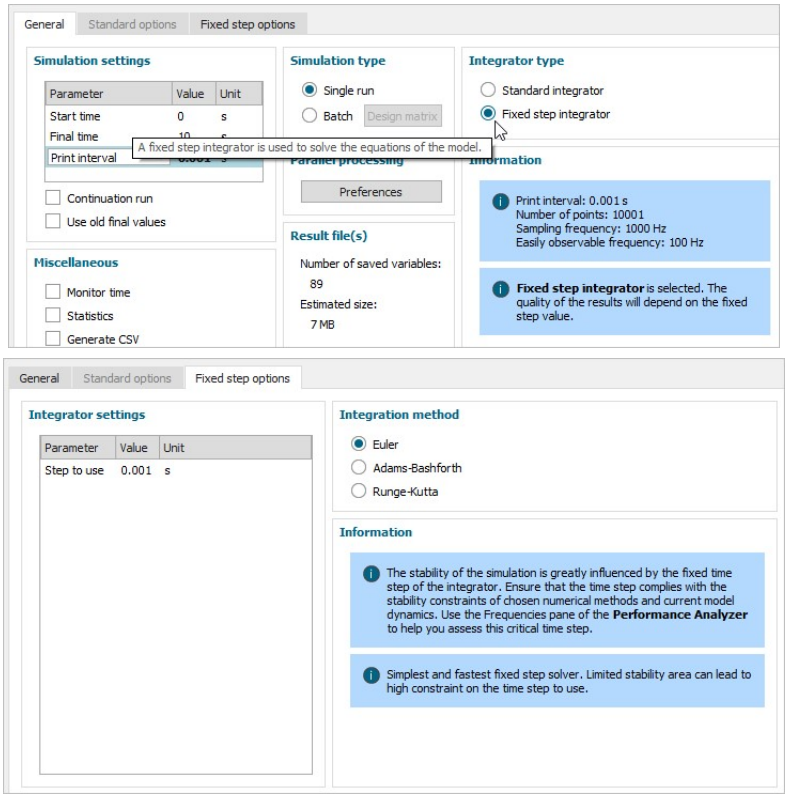


Figure 2-31. Selecting the Fixed step integrator in the Run Parameters dialog box

The result variables are available in the variable list shown in the figure below, and can be plotted (see figure Plot of the input and the output variables of the two submodel instances).

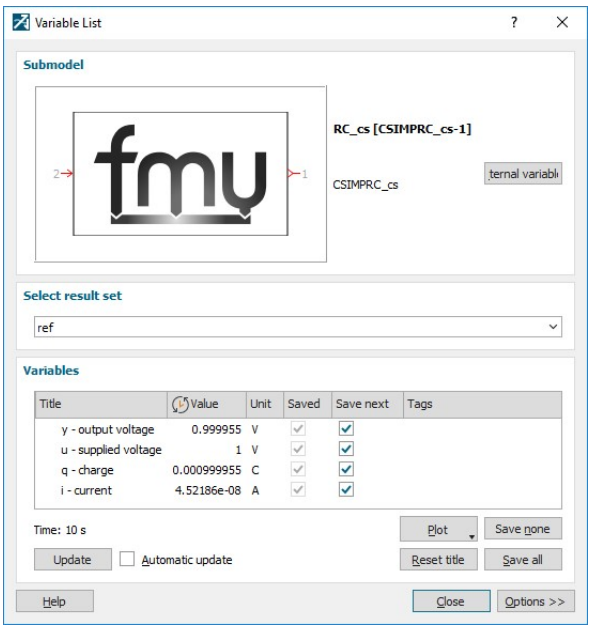


Figure 2-32. Variable list dialog box showing available result variables

〈Import of an FMU for Model Exchange
Creating and exporting FMU〉