Lab Exercise 12- Design, Simulate and Export Simulation Output to CSV using OpenModelica

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1. Aim

To design a Mass-Spring-Damper model in OMEdit, simulate it using OMShell, and export the simulation results to a CSV file.

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2. Software Required

• OpenModelica (OMEdit + OMShell)
• Windows OS
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3. Theory

OpenModelica:

• Generates result files in .mat format (binary) by default
• Older versions do NOT support --outputFormat=csv

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4. Model Design in OMEdit

Step 1: Open OMEdit

Launch OpenModelica → Open OMEdit

Step 2: Create New Model

File → New Model

Name:

CSVDrivenMassSpring

Click OK.

Step 4: Use Textual Model

Switch to Text View and paste:

```
model CSVDrivenMassSpring
  parameter Real m = 1;
  parameter Real k = 10;
  parameter Real c = 1;

  Real x(start=0);
  Real v(start=0);

equation
  der(x) = v;
  m*der(v) + c*v + k*x = 1;
end CSVDrivenMassSpring;
```

Click Check Model.

Save the model.

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5. Simulate Using OMShell

Open OMShell.

Load model:

```
loadFile("D:/NOBLEPROG/Modelica/PROJECTS/CSVDrivenMassSpring.mo");
```

Simulate:

```
simulate(

CSVDrivenMassSpring,

stopTime=10,

simflags="-r=D:/NOBLEPROG/Modelica/PROJECTS/ExportCSVLab_res.mat"

);
```

Result:

Creates:

```
CSVDrivenMassSpring_res.mat
```

Location:

D:/NOBLEPROG/Modelica/PROJECTS/

Step 2: Convert MAT to CSV

Run:

```
filterSimulationResults(
"D:/NOBLEPROG/Modelica/PROJECTS/ExportCSVLab_res.mat",
"D:/NOBLEPROG/Modelica/PROJECTS/ExportCSVLab_res_1.csv",
{"time","x","v"}
);
```

Explanation:

• First argument → MAT input file

• Second argument → CSV output file

• Third argument → variables to export

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9. Verify CSV Output

Go to:

D:/NOBLEPROG/Modelica/PROJECTS/

Open:

```
ExportCSVLab_res.csv
```

You should see readable output:

Example

time,x,v

0.0,0.0,0.0

0.01,0.0023,0.12

...

7. Creating a Script File (.mos) (Optional)

Instead of typing manually, create:

```
runScript.mos
```

Add:

```
loadFile("D:/NOBLEPROG/Modelica/PROJECTS/CSVDrivenMassSpring.mo");

simulate(

CSVDrivenMassSpring,

stopTime=10,

simflags="-r=D:/NOBLEPROG/Modelica/PROJECTS/ExportCSVLab_res.mat"

);


filterSimulationResults(

"D:/NOBLEPROG/Modelica/PROJECTS/ExportCSVLab_res.mat",

"D:/NOBLEPROG/Modelica/PROJECTS/ExportCSVLab_res.csv",

{"time","x","v"}

);
```

Step 9: Run Script File

In OMShell:

```
runScript("D:/NOBLEPROG/Modelica/PROJECTS/runScript.mos");
```

This automates:

- Loading
- Checking
- Simulating
- Exporting results