

Lab Exercise 11- Reading CSV Input in OMShell and Plotting Mechanical Model Output

Objective

After this lab, students will be able to:

1. Create a mechanical model in OMEdit
 2. Import time-force data from CSV file
 3. Use OMShell to simulate
 4. Plot displacement response
 5. Perform basic input-driven simulation
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System Description

We simulate a **Mass–Spring–Damper system**:

$$m\ddot{x} + c\dot{x} + kx = F(t)$$

Where:

- Input force $F(t)$ is read from a CSV file
-

PART 1 — Create CSV Input File

Step 1 — Create CSV File in Excel

Create a file named:

```
forceInput.csv
```

With this structure:

```
time,force
0,0
1,10
2,0
3,-10
4,0
5,5
6,0
7,-5
8,0
9,0
10,0
```

Save it in:

C:/Users/Administrator/Documents/OpenModelica/

Important:

- First column = time
 - Second column = force
 - No extra spaces
-

PART 2 — Create Mechanical Model in OMEdit

Step 2 — Open OMEdit

File → New Modelica Class

Name: **CSVDrivenMassSpring**

Switch to **Text View**

Step 3 — Paste This Code

```
model CSVDrivenMassSpring

  parameter Real m = 1;
  parameter Real k = 100;
  parameter Real c = 5;

  Real x(start=0, fixed=true);
  Real v(start=0, fixed=true);

  Modelica.Blocks.Sources.CombiTimeTable forceTable(
    tableOnFile = true,
    fileName = "D:/NOBLEPROG/Modelica/PROJECTS/forceInput.csv",
    columns = {2});

equation
  der(x) = v;
  m*der(v) + c*v + k*x = forceTable.y[1];

end CSVDrivenMassSpring;
```

Save the model.

PART 3 — Simulate in OMEdit (Quick Check)

Click Simulate.

If simulation runs → model is valid.

Close plot window.

PART 4 — Use OMShell to Run Simulation

Step 4 — Open OMShell

Start Menu → OMShell

You should see:

>>

Step 5 — Load Modelica Library

```
loadModel(Modelica);
```

Step 6 — Load Model File

```
loadFile("C:/Users/Administrator/Documents/OpenModelica/CSVDrivenMassSpring.mo");
```

Should return:

true

Step 7 — Simulate from OMSHELL

```
simulate(CSVDrivenMassSpring, stopTime=10);
```

Wait until simulation completes.

PART 5 — Plot Results

Step 8 — Plot Displacement

```
plot(x);
```

You should see displacement response due to force input.

Step 9 — Plot Force Input

```
plot(v);
```

This verifies CSV input is working.

PART 6 — Scenario Study

Try modifying:

Mass:

```
simulate(CSVDrivenMassSpring, stopTime=10, simflags="-override m=2");
```

Damping:

```
simulate(CSVDrivenMassSpring, stopTime=10, simflags="-override  
c=20");
```

Observe:

- Higher damping \rightarrow smaller oscillation
 - Higher mass \rightarrow slower response
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Expected Results

You should observe:

- Input force shape from CSV
- Corresponding displacement response
- Damped oscillations