

# **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
- 

## **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 → smaller oscillation
  - Higher mass → slower response
- 

## Expected Results

You should observe:

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