# Sheet 13 – Simulink

## Exercise 1:

Create a mechanical model of an (undamped) mass sitting inside two springs (see Fig. 1) without gravitational forces. The springs should have the same spring constant $k_1 = k_2 = 1 \frac{N}{m}$ and the mass should be 2 kg. To do this, follow these steps:

a) Think about the physics involved. What are the forces? How do they connect with displacement and velocity?

b) Create your model in Simulink according to the physical equations.

c) Put scopes for displacement and velocity.

d) Run the model with a pulse of amplitude 1 and watch it moving freely.

e) Explore how changing mass and spring constants change the dynamics of the system. Also explore the phase relationship between displacement and velocity.

## Exercise 2 (optional):

Extend your mass-spring model by adding friction. How do displacement and velocity change?

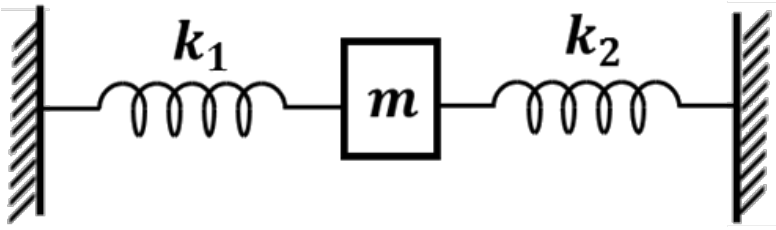


Fig.1: Mass-spring model