Assignment III

ME 3030– Modeling and Simulation (2023-2024)
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Question 1

Consider the two-mass spring-damper system as given in Assignment 1, with the following initial displacement conditions $t = 0$ sec:

$x_1(0) = 0$, $y_1(0) = 0$,
$x_2(0) = 0.5$, $y_2(0) = 0$,

and boundary conditions at $t = 2$ sec:

$x_1(2) = 1$, $y_1(2) = 1$,
$x_2(2) = 1$, $y_2(2) = 1.5$,

as shown in Figure 1.
Find the initial velocity conditions $\dot{x}_1(0)$, $\dot{y}_1(0)$, $\dot{x}_2(0)$, and $\dot{y}_2(0)$ such that the system will reach the final configuration in 2 seconds. Use the ODE solution solver that you have developed using the Runge–Kutta (RK4) integration technique combined with the Newton Raphson method to solve the boundary value problem.

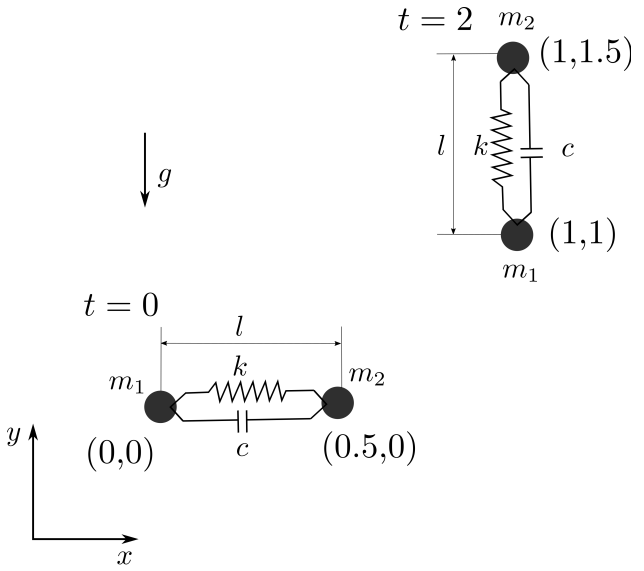

Figure 1: Schematic of the two-mass spring-damper system at $t = 0$ sec and $t = 2$ sec.