元智大學機械工程研究所 博士班資格考試
計算固力－振動學

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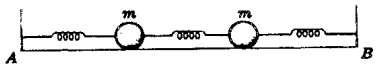
1. The two equal masses m are connected by springs having equal spring constant k, as shown in the figure, so that the masses are free to slide on a frictionless table AB. The walls at A and B to which the ends of the springs are attached are fixed.
   (a) Set up the differential equations of motion of the masses.
   (b) Find the normal frequencies and the normal modes of vibration for the system.
   (c) Suppose that the first mass is held at its equilibrium position while the second mass is given a displacement of magnitude a > 0 to the right of its equilibrium position. The masses are then released. Find the position of each mass at any later time.



2. Two harmonic motions of the same amplitude but of slightly different frequencies are imposed on a vibrating body. Analyze the motion of the body by listing the equations and using graph to explain.

3. A simple pendulum is hinged at the center of mass M as shown in the figure. Mass M is shifting on a frictionless horizontal surface. Find the natural frequencies of the system.