

Tutorial 9

Problem 1. (K. & K. 10.10)

1. A satellite of mass m is in circular orbit about the Earth. The radius of the orbit is r_0 and the mass of the Earth is M_e . Find the total mechanical energy of the satellite.
2. Now suppose that the satellite moves in the extreme upper atmosphere of the Earth where it is retarded by a constant feeble friction force f . The satellite will slowly spiral toward the Earth. Since the friction force is weak, the change in radius will be very slow. We can therefore assume that at any instant the satellite is effectively in a circular orbit of average radius r . Find the approximate change in radius per revolution on the satellite, Δr .
3. Find the approximate change in kinetic energy ΔK of the satellite per revolution.

Problem 2. K. & K. 11.3 A 0.3-kg mass is attached to a spring and oscillates at 2 Hz with a Q of 60. Find the spring constant and the damping constant.