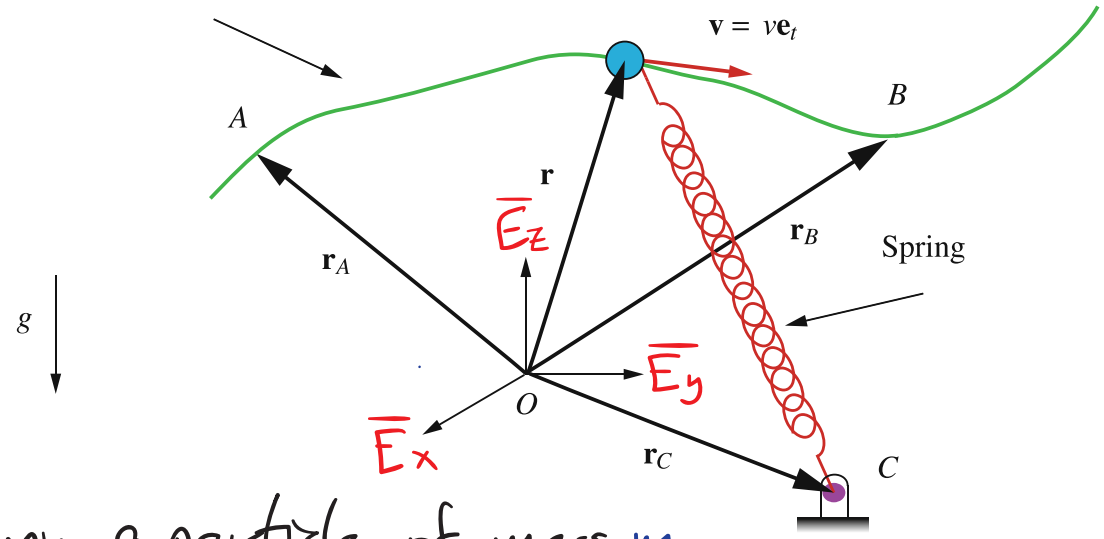
5.7 A Particle Moving on a Rough Curve (example)

Path of particle on a rough curve



Given a particle of mass m, moving on the fixed, rough space curve above; attached to the linear spring with spring constant k and unstretched length L; in a gravitational field; find:
(a) the work done by friction from point A to point B +
(b) if the curve was smooth, $\bar{v}(t_B)$ given $\bar{v}(t_A)$.

5.7.1 Kinematics

5.7.2 Forces

So the resultant force is:

5.7.2 Work done by friction

From the work-energy theorem:

The spring + gravitational forces are conservative, so the other form of the work-energy theorem is helpful:

So we can compute W_{ABf}, the work of the friction force, without computing the complicated integral.

The Planar Pendulum (example)