

When learning a new approach, it is sometimes helpful to solve a familiar problem to explore how the new approach works. Here is a problem that you probably solved using a Newtonian approach in introductory physics (it's ok if you haven't - but if not, I encourage you to do it as an exercise!)

Consider a solid sphere with mass m and radius R rolling down an incline on the surface of Earth that makes an angle θ with respect to the horizontal.

Use x measured down the incline, with $x = 0$ at the top of the incline, as your configuration coordinate. Find the equation of motion of the sphere using a Lagrangian approach.