

Exercise 1

If \mathbf{r} is the instantaneous position vector for a particle, show that the velocity and acceleration of the particle are given by (use Eq. A.7-2):

$$\mathbf{v} = \frac{d}{dt}\mathbf{r} = \delta_r \dot{r} + \delta_\theta r \dot{\theta} + \delta_z \dot{z} \quad (\text{A.7-34})$$

$$\mathbf{a} = \delta_r (\ddot{r} - r\dot{\theta}^2) + \delta_\theta (r\ddot{\theta} + 2\dot{r}\dot{\theta}) + \delta_z \ddot{z} \quad (\text{A.7-35})$$

in cylindrical coordinates. The dots indicate time derivatives of the coordinates.