

A bead of mass  $m$  in a uniform gravitational field along the  $z$ -axis is strung on a parabolic wire described by  $z = \alpha\rho^2$  and slides without friction. The wire is rotated about the  $z$ -axis with constant angular velocity  $\omega$ . Use the method of Lagrange multipliers to find the equation of motion for the bead and expressions for the Lagrange multipliers. What does each of the multipliers represent?

