

A fly is walking around on a circular disk that rotates with constant angular velocity  $\omega$ .

1. What are the proper generalized coordinates describing the position of the fly relative to the surface of the disk? Assume that the origin is at the center of the disk.
2. Write down the Lagrangian for the fly in terms of these generalized coordinates (kinetic energy only). What are the generalized momenta? Which of them are conserved?
3. Convert the Lagrangian into the corresponding Hamiltonian for this problem, using the generalized coordinates and momenta. Write down Hamilton's equations of motion.