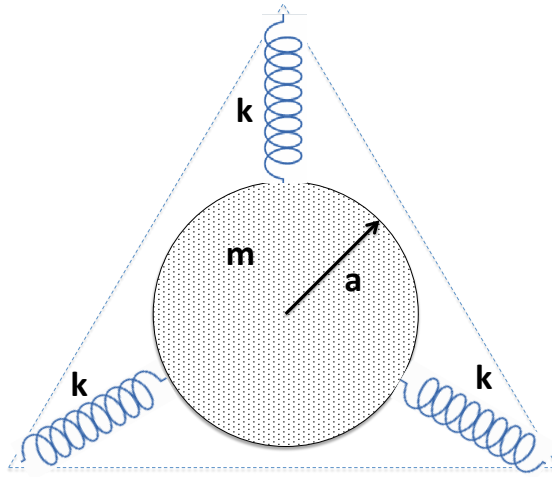3. **Disk with Three Springs**

A uniform disk of mass m and radius a rests on a horizontal frictionless surface. It is symmetrically attached to three identical, ideal, massless springs of spring constant k whose other ends are attached to the three vertices of an equilateral triangle.

At equilibrium, the length ℓ of the springs is greater than their relaxed length ℓ_0. The disk remains in the initial horizontal plane but is otherwise free to move. (The diagram shows the view looking down on the plane.) What are the frequencies of the normal modes of small oscillations? What do the modes look like?