☹ me-que-12008

Consider a particle of mass μ moving in a potential

$$V(r) = \frac{1}{2}\mu\omega^2 r^2 + \frac{\lambda^2}{2\mu r^2}.$$

(a) Find condition on energy E and angular momentum L for circular orbits to exist.

(b) Does there exist a circular orbit for $L = 0$?

(c) Assume orbital angular momentum $L = 0$, energy $E = \frac{25}{2}\mu\omega^2 a^2$, $\lambda = 12\mu\omega^2$ Use initial conditions

$$r(t)\big|_{t=0} = 4a; \quad \dot{r}(t)\big|_{t=0} = 0 \text{ and } \dot{\theta(t)}\big|_{t=0} = 0$$

solve the equations of motion and obtain r, θ as function of time. Describe the motion that takes place under conditions specified here.

Note This is a variation of me-que-12002