

HULA

HOOP



Title: **HOOP**
 Author: **HOOP**
 Date: **HOOP**
 Subject: **HOOP**



$$L\ddot{\theta} + k\dot{\theta} = -F_1 R \quad (1)$$

$$m(R-r)\ddot{\varphi} = m(\ddot{x}\sin\varphi + \ddot{y}\cos\varphi) + F_2 \quad (2)$$

$$m(R-r)\dot{\varphi}^2 = N + m(\dot{x}\cos\varphi - \dot{y}\sin\varphi) \quad (3)$$

A hula hoop with the radius R leaning with the angle φ around a circular waist (hoop) with the radius r . The center O' of the waist moves along the elliptic curve $x = R \cos \omega t$, $y = R \sin \omega t$ with the fixed center O .

1. Introduction: A hula hoop is a popular toy. It is a ring that is flexible enough to be bent into a circle. It is made of a material that is strong and elastic. It is used for exercise and entertainment.

2. Theory: A hula hoop is a ring of radius R and mass m . It is tilted at an angle φ from the vertical. The center of mass is at a distance r from the center of the hoop. The hoop is supported by a central mass of radius r and mass M . The center of mass of the hoop is at a distance $R-r$ from the center of the hoop. The center of mass of the hoop is at a distance $R-r$ from the center of the hoop.

3. Equations of Motion: The equations of motion for the hoop are given by the following equations: