In the name of God

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COMPUTATIONAL PHYSICS

Exercise Set 8

(Date Due: 1397/02/23)

1. Logistic map: plot bifurcation, one-cycle, two-cycle, four-cycle and chaotic regime.

2. Chaotic oscillation: suppose the following equation:

$$\frac{d^2\theta}{dt^2} = -\omega_0^2 \sin\theta - \alpha\frac{d\theta}{dt} + f\cos(\omega)$$

where $\omega_0 = 1$, $\alpha = 0.2$, $f = 0.52$ and $\omega = 0.666$. Plot phase diagram and $\left|\frac{d\theta}{dt}\right|$ as a function of driving force f.

3. Lorenz attractor: suppose following coupled equations:

$$\frac{dx}{dt} = 10(y - x)$$

$$\frac{dy}{dt} = -xz + 28x - y$$

$$\frac{dz}{dt} = xy - \frac{8}{3}z$$

Solve them and plot phase diagram of each them.

Good luck, Movahed