EXCITATION OF PARAMETERS IN NONLINEAR SYSTEMS AND CHAOS CONTROL

Scholar
Ilyas Miyan

Supervisor
Prof. Z.A. Taqvi
Department of Mathematics,
Jamia Millia Islamia
New Delhi-25

Co- Supervisor
Dr. Ayub Khan
Department of Mathematics,
Dr. Zakir Husain College ,
University of Delhi,
Delhi -110006.

The solar system dynamics, which is said to be the birthplace of mechanics, is composed of orbital and rotational motion of planets and their satellites. Coupling of these motions and slow evolution of orbits and spins due to tidal friction are the problems of great importance. It has been now proved that solar system is also full of irregularity and disorder. Some works have already been done to study various kinds of motion in solar system.

The French Mathematician Henry Poincaré , who is now known as founder of modern chaotic theory, observed in (1908) that "A fully deterministic system does not necessarily imply an explicit prediction on the evolution of a dynamical system". We say a dynamical system is chaotic if it is sensitive to the initial conditions. Poincaré 's theory gain momentum after the work of Lorenz, (1963) who discovered famous Lorenz attractor.

At present, the subject "Dynamical System" occupies a front line area of research and it is penetrating into almost all areas of konwledge.

The objectives of the proposed work are as follows:

1. To study in detail the mathematical theory concerning the phenomena nonlinear dynamical system and those evolving chaotic motion and apply the tools and principles of dynamical systems to various real and natural problems. Smale (1967) find some important clues to understand regularity and irregularity behaviour in the nonlinear system.
2. Significant contributions in theories of developments in controlling chaos are made by Shinbrot (1995), Linder et al (1997), Yang et al (1997) and some recent researchers. In most of these work it has been observed that chaotic motion can be changed into a regular one by coupling the system with another system which is chaotic or introducing certain kind of disorder into the system such as noise, convection etc.
3. Problems of chaos control in Astronomy and Astrophysics are also very

interesting. Maciejewski (1992), Bhatnagar, Khan & Saha (1994) etc.

Our findings:

In our study we have discussed two problems altogether

1. Effect of solar radiation pressure in nonlinear planar oscillation of Mimas – Tethys system.

2. Inter connected satellite system of artificial satellites.

3. In the first problem we have seen the influence of solar radiation pressure parameter in the rotational motion of Memas-Tethys system and its controlling behaviour.

   In the second problem we have studied the effect of tidal torque parameter in Inter connected satellite system and its controlling behaviour.