

Project for Computational Physics Course

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1 Topics

This is the project proposal that I have decided to do for my computational physics course.

- I want to solve the differential equation of motion of a particle in two dimension. At first I want to study integrable system in two dimension. for these systems there exists a second conserved quantity, a constant of motion, constraining the trajectory to a two dimensional manifold in the four dimensional phase space. I want to solve the equation by any one of these methods such as 1. Runge-Kutta method 2. Euler's method 3. Taylor series method 4. Multistep method. Then I want to observe the change of accuracy by changing steps. After that I will replace the method of integration by one of the other method and will try to observe the change in the accuracy and I also keep in mind the time needed for each of these methods.
- Then I will change the potential to a central potential and want to observe the trajectories. We can do this for various central potential and I may also change the initial condition to observe the change of trajectories.
- In next step of my project I want to solve a differential equation which is not solvable analytically. In this step I will try to solve Henon - Heiles ODE numerically by Runge-Kutta method. Then I will try to implement the conservation of energy to provide a check on the accuracy of the solution. And I will try to find the trajectories for various values of energy.