Gravitational N-Body Simulations

Gudbrand Tandberg

9. oktober 2014

1 Abstract

2 Introduction to the N-body problem

3 Logbook

8.10.2014. Initialized git repo. Created files main.cpp, NBody_functions.cpp/h, ODESolver.cpp/h. Started shell implementation of ODESolver, helper functions and a possible main-functions. Spent time contemplating some major design issues.

9.10.2014. Started coding. Discussed many design choices with the group teachers. Renamed ODESolver to NBodySolver and wrote the class Body. Wrote stub implementations of key methods. The flow of the program is unravelling as I work. Plan for the nearest future: get NBodySolver to work using Eulers method and a simple 2-body initial configuration.

4 TODO

Write python script that generates the following initial conditions (and more!)

- Sun-earth-moon system
- Solar system (with/without moons)
- Spaceship launch from the earth
- Halleys comet enters orbit
- randomly placed inside a disk with 'correct' orbital velocity
- randomly placed (weighted in the center) inside a disk with 'correct' orbital velocity
- randomly placed inside a sphere with tangential velocity/no velocity