Mathematica® notebook

Description of the codes

I write some notebook (.nb) routines to study the restricted three body problem.

I put here the title of all notebook and a little description for each file. In every file, anyway, You can find a brief description of every routine I used.

1. Chirikov.nb :

Contains two routines to calculate the standard map for the pendulum and the Chirikov method to study the chaos for the restricted three body problem resonances.

2. densityEvolutionDiffusion.nb :

Contains one routine that plot a function (a solution of a particular PDE) varying a parameter (time) and find the maximum for every function shown.

3. IntegrMethod*.nb:

Solve the equation of motion for the restricted three body problem and analyze the precision of the integrator method '*' for a particular orbit. This is done using an integral of motion (Jacobi Costant): if this value vary in time during the integration then the integrator make some error. Higher this variation lower the precision of the method.

4. intersezione.nb :

Contains three routines. The first calculate the 3D surface of Jacobi ('potential') and the Jacobi constant (a 2D green plane that intersect the surface of Jacobi 'J'). This is done 4 times for 4 different value of the Jacobi constant.

The second routine calculate also the motion of a test object for a restricted three body problem and draw the orbit in the J green plane and overplot it whit the 3D Jabobi's surface.

The third is a de-zoom of the second routine.

5. Jabobi2dSection:

The same of the first routine in intersezione.nb but now for a 2D Jacobi Surface and a 1D Jacobi constant. In this routine I found a warning message:

```
Solve::ratnz: Solve was unable to solve the system with inexact
coefficients. The answer was obtained by solving a corresponding
exact system and numericizing the result. 
```

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6. Lyapunov.nb :

This notebook calculate the Lyapunov characteristic exponent (LCE) for the restricted three body problem using a **do** cycle in which it calculated (every timestep) the distance between to near orbits.

7. risonanze.nb:

Contains four routine. The first one plot calculate the position of resonances for the Sun-Jupiter-asteroid three body problem and overplot it with the histogram of the real position and numbers of asteroid for the Main Belt, using the Mathematica® AsteonomicalData online database.

The second one calculate the distance between near resonances respect to the distance of them from the planet. This is done with two different method. I found the following warning error:

General: : obspkg: "PlotLegends` is now obsolete.

The legacy version being loaded may conflict with current Mathematica functionality.

See the Compatibility Guide for updating information"

The third contain the position of resonances respect to the position of the planet and a green rectangular region in which the motion is chaotic.

The fourth one contain the libration width of resonances overplotted with the position of real asteroids (using again the AstronomicalData) in the a-e plane.

Thanks,

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