

Coulomb Ring Structures

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1. In the system "Coulomb ring structure" the programs and data are submitted, which are used in the paper "Planar multilayer Coulomb structure" [1]. This work was preceded by "Axisymmetric Coulomb Interaction and Instability of Orbits" [2] - [3], which deals with single-layer Coulomb structure. The program InCnPrClb.mcd for creating single-layer structures is in the Galactica system. The last part of its link is GalactW/ModCoulm/InCndFsQ/InCnPrClb.mcd [4]. The Manual of the Galactica system is in [4] - [5]. To use the system "Coulomb ring structures" the user should be examine the Manual and program InCnPrClb.mcd.

2. The system of "Coulomb ring structure" includes programs for creating structures, examples of the structures, programs for studying dynamics of structures and an example of an input file galacf26.dat for the system Galactica.

3. Programs for creation of ring structures are in the following files:

RtStClb2.for is the text of the program;

RtStClb2.exe is an executable program for a personal computer;

RtStClb2e is executable program with an extended length of number (34 decimal digits) for the supercomputer of UNIX system;

RtStClb2.dat is file of input data for executable program;

RtNcJR01.dat is file of the layers radii, which was used to create the structure B205c08p.dat.

4. The examples of the structures are files of initial conditions for these structures.

A204c06p.dat - in this structure the initial period of rotation Prd is defined by the formula (38) [1]. The angle of the first particles in the layers alternated. It corresponds to second variant Ivar = 2 in file RtStClb2.dat. The structure is composed of 4 layers with 6 particles in each layer. These parameters are marked in the file name A204c06p.dat.

In other structures:

B102c100.dat;

B202c100.dat;

B202c12p.dat;

B205c08p.dat

the initial period of rotation Prd is calculated by the formula (35) [1]. The angles of the first particles in the layers of the structure B102c100.dat are equal zero. This corresponds to the first variant $Ivar = 1$ in the file RtStClb2.dat.

5. Programs for studying the dynamics of structures.

5.1. ReadFilQlb.mcd is program for reading and analyzing the results of the main files of system Galactica as files 1, 2, 3, ..., garek29.dat. The program is also applied to the files of the initial conditions, which are given in Sec. 4. As an example, the program ReadFilQlb.mcd uses the file B205c08p.dat.

5.2. ReadDice.mcd is program for reading and analyzing the file encounters dice.dat.

DcA4c6b2p is sample of file dice.dat when considering the dynamics of the structure A204c06p.dat. In this case, we consider encounters of 2nd particle. Here the numbers of particles start from zero, where 0 is number of the central particle.

5.3. ReadTraekt.mcd is program for reading and analyzing the files of trajectories 1t, 2t, 3t, ..., traekt.prn, which contains only the coordinates of the particles. The program uses the parameters of the system Galactica: Kli, Ltk, K115 etc for reading of the required quantities from the file of trajectories.

TrA4c6p2 is example of file of trajectories formed from the files $1t + 2t + 3t + \dots + traekt.prn$. It contains the coordinates of the particles in the study of the structure A204c06p.dat. Particular attention is given to particle 2.

5.4. ReadTraeVl.mcd is program for reading and analyzing the file of trajectories, which contains the coordinates and velocities of the particles.

TrA4c6p7v is example of trajectories file. It contains the coordinates and velocities of the particles in the study of the structure A204c06p.dat. Particular attention is given particle 7.

6. galacf26.dat is an example of an input file for the system Galactica. It used to investigate the structure B205c08p.dat.

7. The programs in MathCad environment no detailed explanation. They are given in the above file InCnPrClb.mcd.

References

1. Smulsky J.J. Planar Multilayers Coulomb structures / Institute of the Earth's Cryosphere SB RAS. - Tyumen, 2015. - 54 p. - Fig.: 35. Refer.: 24. - Russian. - Dep. In VINITI 27.02.2015, No. 38-V2015. (In Russian). www.ikz.ru/~smulski/Papers/PMKStr.pdf.

2. Smulsky J.J. Axisymmetric Coulomb Interaction and Instability of Orbits / Institute of the Earth Cryosphere SB RAS. - Tyumen, 2013. - 30 p. - Fig.: 12. Refer.: 22. - Russian. - Dep. In VINITI 28.10.2013, No. 304-V2013. (In Russian). <http://www.ikz.ru/~smulski/Papers/KulInt2.pdf>.

3. Smulsky J.J. Axisymmetric Coulomb Interaction and Research of Its Stability by System Galactica // Open Access Library Journal, 2014, 1, e773. doi:<http://dx.doi.org/10.4236/oalib.1100773>. p. 1 – 23.
Additional url: http://www.oalib.com/articles/3100311#.VCj3VWd_t74.
4. Smulsky J.J. System Galactica. 2012. <http://www.ikz.ru/~smulski/GalactcW/>.
5. Smulsky J.J. Module of System Galactica with Coulomb's Interaction // I. J. Modern Education and Computer Science, 2014, Vol. 6, No. 12, pp. 1-13. <http://dx.doi.org/10.5815/ijmeecs.2014.12.01>.