Some samples of building a system of objects of a given kind

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Annotation

According to Urmantsev's System theory [1] a system of objects is built. In the first and second samples a set of prime numbers is considered as a system of objects. A difference between two prime numbers is taken as a relation between objects. A periodicity is found in the pair of two intervals, to the previous prime number and to the next one. In the next samples the system of objects representing the distance between the center of planets and the sun is considered. Mainly Mercury is considered and some oscillations were found as for annual periods, so as for some particular points of the orbit, aphelion and perihelion.

Keywords

Object-system, prime number, interval, orbit, period.

Introduction

The object is not only a material thing but also thoughts, events, relations [1]

"The *object-system, OS,* is a unity constructed in accordance with relations (in particular, interactions) *r* which are elements of a set *{Ros}* combined with conditions z which are elements of a set *{Zos}* and restrict the relations. The unity is built of primary elements m from a set $\{M_{os}^{(0)}\}$ selected from the universal set *U* according to criteria a, which are elements of a set $\{A_{os}^{(0)}\}$. The sets *{Zos}; {Zos}* and *{Ros}; {Zos}, {Ros} and* $\{ A_{os}^{(0)}\}$ may be empty, or consist of any number of elements, from one to infinity, and the elements may be identical or different."[1]

"A system of objects of a given i-th kind is, essentially, a regular set of object-systems of the same kind. The expressions we use, "of the same kind" or "of a given kind", mean that every object-system has common typical features (one and the same property); namely, each one is constructed of all (or some) primary elements m of the set $\{M_i^{(0)}\}$, in accordance with all (or some) relations r of the set $\{R_i\}$, with some (or all) composition laws *z* which are elements of the set $\{Z_i\}$, realized in the considered system of objects of the given kind. As for an objectsystem, for the system of objects of the same kind the sets *{Z}; {Z}* and *{R}; {Z}, {R} and {A};* and $\{M_i^{(0)}\}$ may be empty, or contain any number of elements, from one to infinity. " [1]

"A very spectacular example of a system of objects of the same kind is the saturated hydrocarbons CH_4, C_2H_6, C_3H_8 ..... $C_{s-l}\ H_{2(s-l)+2}$, C_sH_{2s+2}, All of them are built of the same primary elements, C and H, in accordance with the same relation of chemical affinity and governed by the same composition law, C_nH_{2n+2} (n = 1, 2 ..... s). " [1].

"Any object O is an object-system. " [1]

I. A set of prime numbers as a system-object

A difference between two prime numbers is taken as a relation between objects.

Let’s set three parameters into correspondence with every prime number. The first parameter and the second one are the differences between this number and its two nearest neighbours. The third parameter is the index of the combination of the first and the second ones in the row. Let’s fill the table with the value of the third parameter. The first parameter is in rows, the second one is in columns.

A periodicity can be seen, every third call has zero as a value.

Комбинации первого и второго параметров получаем двумя вариантами.

Two variants are considered.

The first variant - the first parameter (in rows) is a difference between the given prime number and the previous one. The second parameter (in columns) is the difference between the next prime number and the given one. Prime numbers being represented in this table are less than 32000

0	1	2	3	4	5	6	7	8	9	10	11	12
1	0	120	97	0	103	67	0	33	23	0	14	8
2	118	0	148	65	0	33	47	0	22	28	0	7
3	102	127	143	86	58	75	42	21	31	21	22	7
4	0	61	77	0	49	28	0	18	21	0	16	5
5	95	0	62	54	0	41	27	0	13	8	0	4
6	61	39	79	26	28	31	19	10	25	2	5	6
7	0	53	42	0	24	12	0	14	5	0	4	2
8	30	0	24	16	0	15	15	0	3	4	0	0
9	30	32	23	12	27	15	4	5	5	1	1	4
10	0	24	11	0	15	5	0	7	0	0	5	1
11	22	0	21	12	0	7	2	0	5	0	0	0
12	4	10	10	1	4	5	1	2	3	3	1	1

Table 1

The top-right part of the table is represented on the picture.The full table is 35x35 size

The second variant - Pairs of differences of prime numbers are taken consequently

0	1	2	3	4	5	6	7	8	9	10	11	12
1	0	57	54	0	47	37	0	16	13	0	6	6
2	54	0	75	36	0	18	28	0	10	14	0	1
3	50	63	71	42	25	35	19	13	12	8	14	5
4	0	34	37	0	23	15	0	8	8	0	6	1
5	48	0	41	30	0	18	15	0	5	3	0	3
6	27	20	41	14	9	17	12	6	14	1	2	2
7	0	24	18	0	10	5	0	4	3	0	2	2
8	17	0	11	7	0	5	12	0	3	1	0	0
9	16	15	12	7	17	6	1	2	2	0	1	3
10	0	10	6	0	12	3	0	5	0	0	3	1
11	11	0	11	6	0	3	0	0	3	0	0	0
12	3	7	7	0	1	3	0	0	0	1	0	0

Table 2

The periodicity in both tables is the same.

Prime numbers with three parameters are written into the file primesInterval3.txt.
Tables may be displayed on a screen and are written into files tabInterval1.txt and tabInterval2.txt.
The source of the program and the executable file may be taken from [2].
The programming language being used is “C++”.

II. The distance between two cosmic bodies considered as a system of objects

The philosophy looks at the movement and the matter in a wide way. In this article the mechanical movement of material points is considered only.
F. Engels states: "... movement is inconceivable without matter." It is difficult to disagree with this statement. However, mathematics allows us to distinguish the mechanical movement of material points in a separate category with its own properties.
In this article the motion of a body around a focus is considered. With another body in the focus. The movement is asymmetric. Going from the aphelion to the perihelion the distance between two bodies decreases,while going from the perihelion to the aphelion the distance increases. Some characteristics resulting out of this asymmetry are considered below.

In astronomy the tables of celestial coordinates of Sun, Earth or other planets are calculated using equal periods of time, e.g. every midnight.

Except the coordinates and dates of measurement these tables contain distances between the objects.
In the samples below all data is taken from the official NASA site. [3]
To get a table HORIZONTS software is used.

Algorithm for building a system of objects
Choose a body having a closed orbit.
Set a time interval bigger than the rotation period
Calculate a period when the body crosses a particular point, P_1 -- A -- P_2, where P - perihelion, A - aphelion. P_1 и P_2 have different dates.
Take from the table the sequence of distances between the buddy and the rotation focus.

The first way
To build a system of objects of a given kind let's consider a sequence of distances over a period as two sequences each over a half of the period. Let's take the difference of time symmetric pairs of distances as a relation.It means that the point P_1+1 day corresponds to the point P_2 - 1 day, the P_1+2 point corresponds to P_2 -2 point and so on.

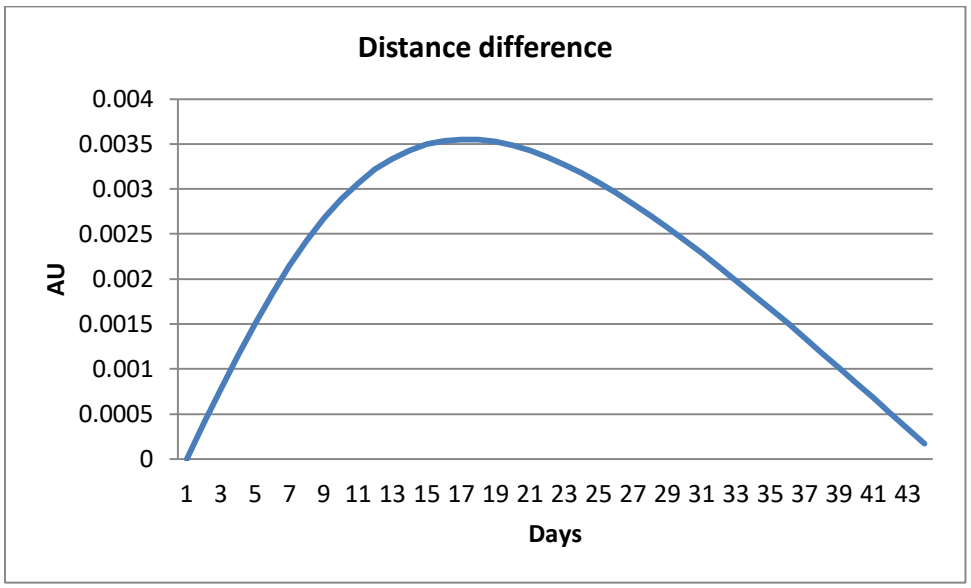
	Converted date and distance from perihelion to aphelion		Date and distance from perihelion to aphelion		Difference
	date	R_1	date	R_2	$R_2 - R_1$
1					
2					

Table 3

Mercury

1	2000-Aug-10 00:00	0,30753	2000-Aug-10 00:00	0,30753	0
2	2000-Aug-09 00:00	0,307655	2000-Aug-11 00:00	0,308048	0,000392
43	2000-Jun-28 00:00	0,466466	2000-Sep-22 00:00	0,466636	0,00017

Table 4



Plot 1

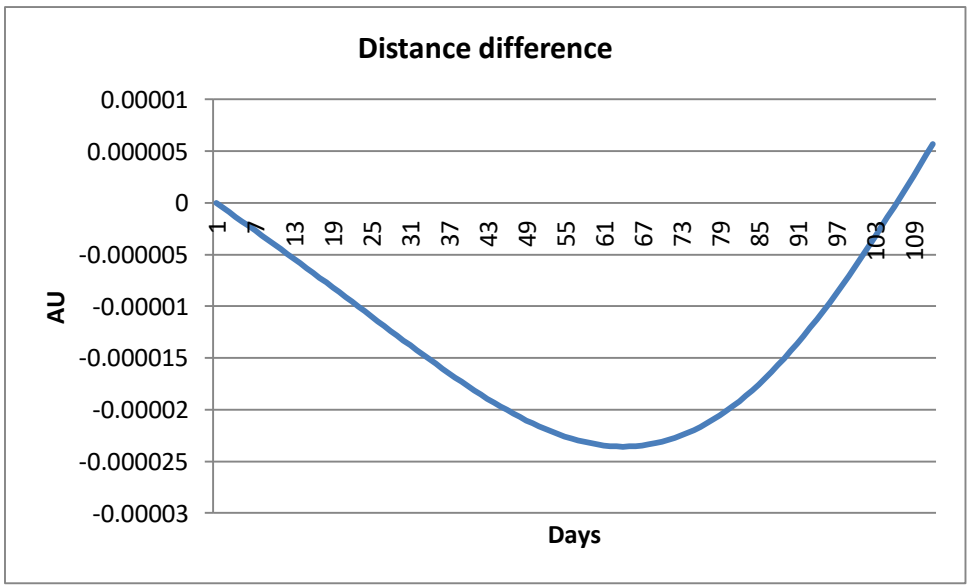
The whole table is represented in the file full_period2_Mercury_Sun.xlsx [4]

Venus

1	2001-Oct-05 00	0,71841143	2001-Oct-05 00	0,71841143	0
2	2001-Oct-04 00	0,718413602	2001-Oct-06 00	0,718413156	-4,45894E-07
112	2001-Jun-16 00	0,728241358	2002-Jan-24 00	0,728247066	5,70797E-06

Table 5

The whole table is represented in the file full_period2_Venus_Sun.xlsx [4]



Plot 2

Earth

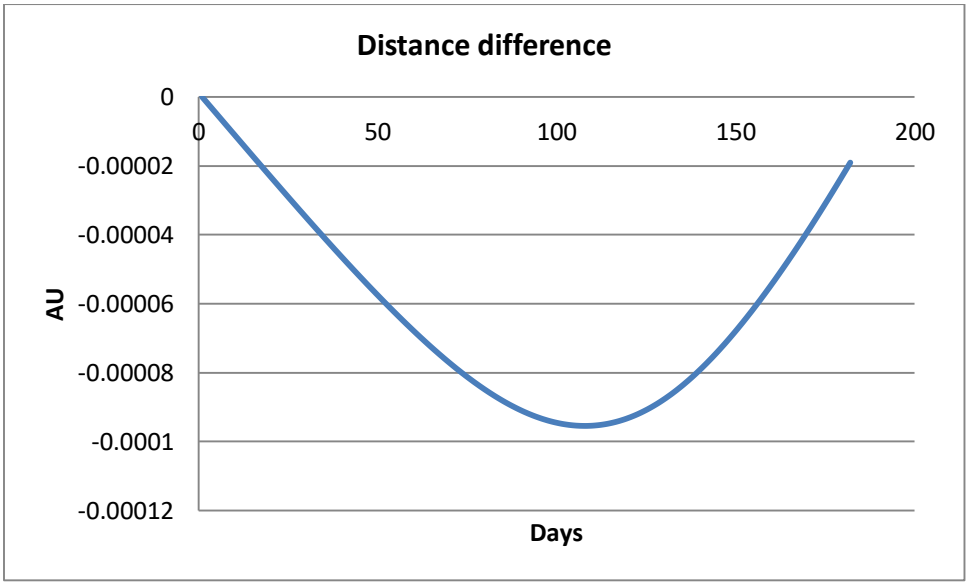
NASA HORIZONS offers data with Earth movement in two types.

1. Centroid Earth-Moon

1	2012-Jan-04 00	0.983303	2012-Jan-04 00	0.983303	0
2	2012-Jan-03 00	0.983307	2012-Jan-05 00	0.983305	-1.2E-06
182	2011-Jul-07 00	1.016716	2012-Jul-03 00	1.016697	-1.9E-05

Table 6

The whole table is represented in the file full period2_EarthMoon_Sun.xlsx [4]



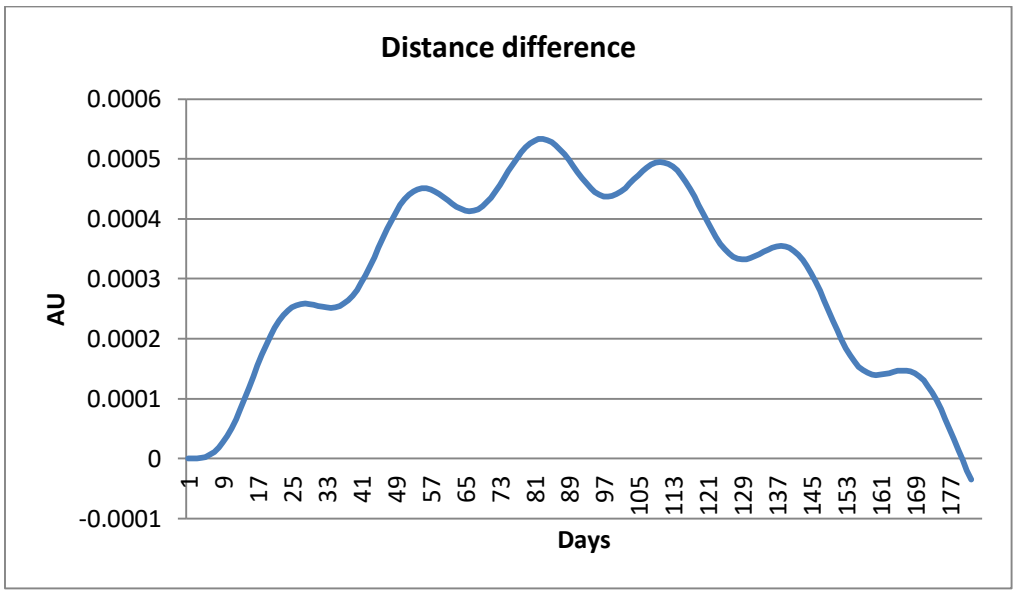
Plot 3

2. Geocentric

1	2012-Jan-05 00	0.983284	2012-Jan-05 00	0.983284	0
2	2012-Jan-04 00	0.983287	2012-Jan-06 00	0.983287	-1.99E-07
					+
					+
182	2011-Jul-08 00	1.01671	2012-Jul-04 00	1.01667	-3.54E-05

Table 7

The who;e table is represented in the file full period2_Earth_Sun.xlsx [4]



Plot 4

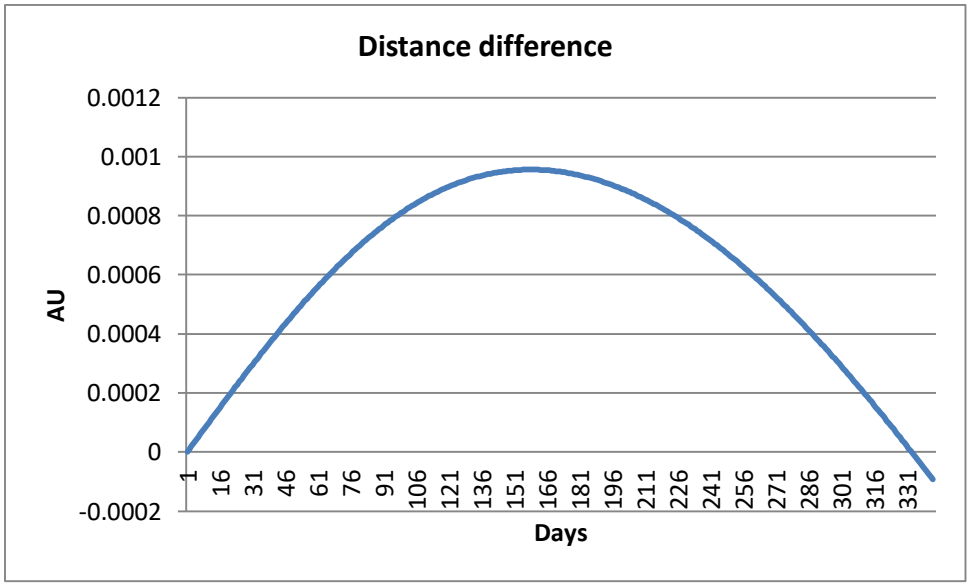
The Moon influence can be seen on the plot 4

Mars

1	2005-Jul-18 00:00	1,38129748	2005-Jul-18 00:00	1,381297483	0
2	2005-Jul-17 00:00	1,38129969	2005-Jul-19 00:00	1,381309766	1,0071E-05
343	2004-Aug-10 00:00	1,66611663	2006-Jun-25 00:00	1,66602365	-9,29802E-05

Table 8

The whole table is represented in the file full period2_Mars.xlsx [4]

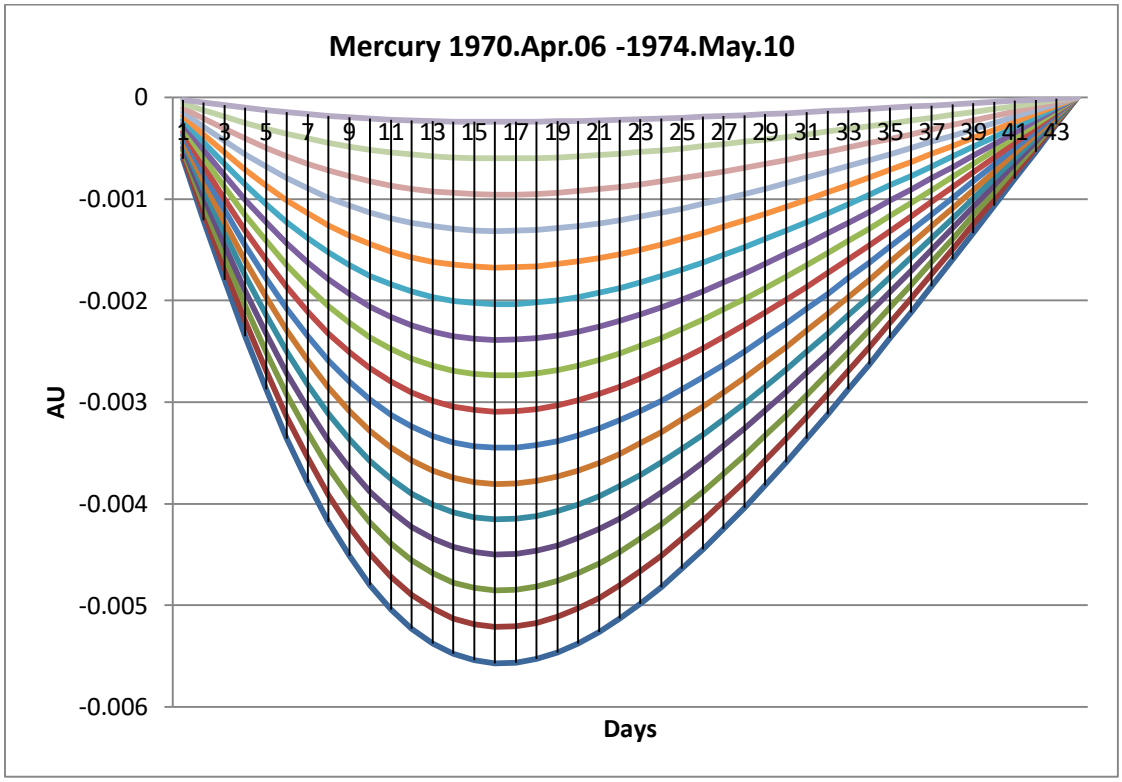


Plot 5

Fluctuations of distances of giant planets have a more complicated form. For the initial analysis let's consider the orbits of the first four planets. On plots 1-5 a symmetry breaking can be seen. The distances over two half periods are not equal. The difference in moving over the first and the second half periods is that in the first case the body is approaching the focus and in the second case the body is heading away from the focus. But having plots 1-5 is not enough to state that this characteristic is the reason for the symmetry breaking, because the asymmetry alters the sign.

Having Mercury as a sample ket's show that the given asymmetry reveals a new symmetry, in fact a periodicity. To do this let's build up a sequence of differences of half-period lengths. E.g. let's take the period 1970.01.01 - 2020.01.01. The Search_for_negative_sequences.exe[4] software shows that there are 207 periods and 13 cases of sign changing of the difference between half period lengths over this period.

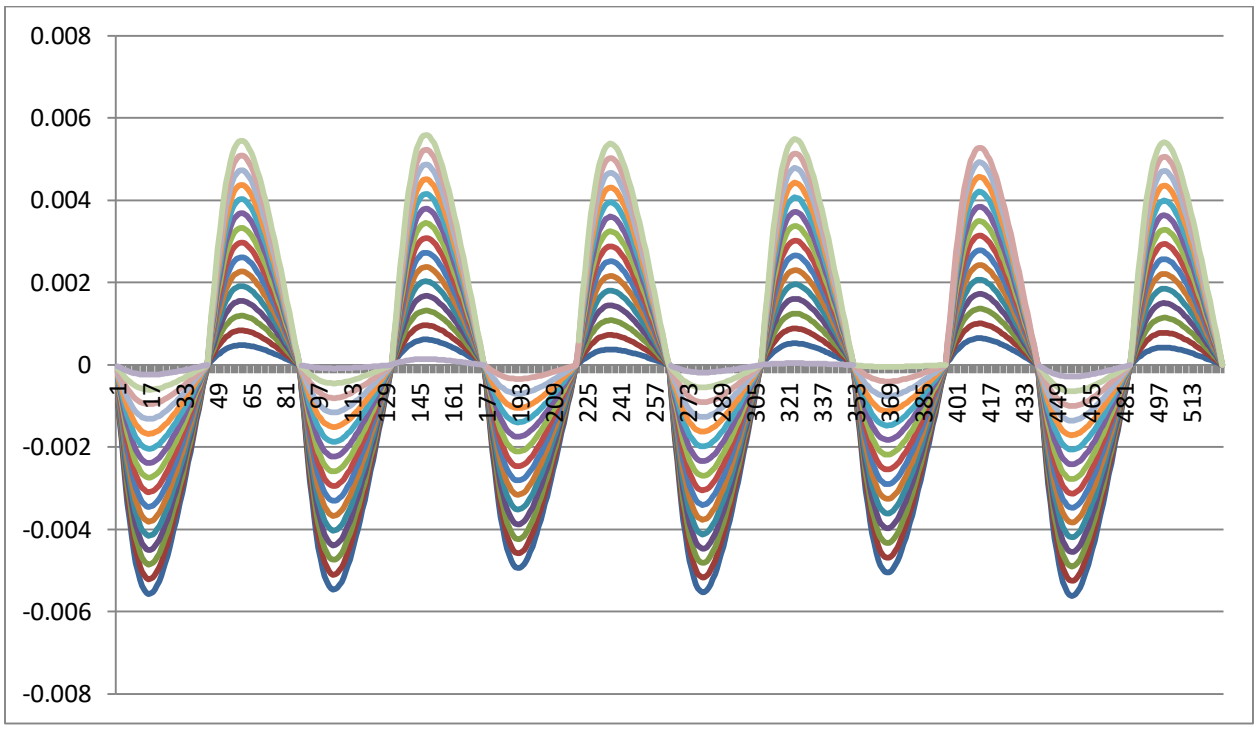
Mercury



Plot 6

The table of data for plot 6 is represented in the file Mercury_radius_difference1.xlsx [5].

Mercury 1970.Apr.06 -2013.Nov.08

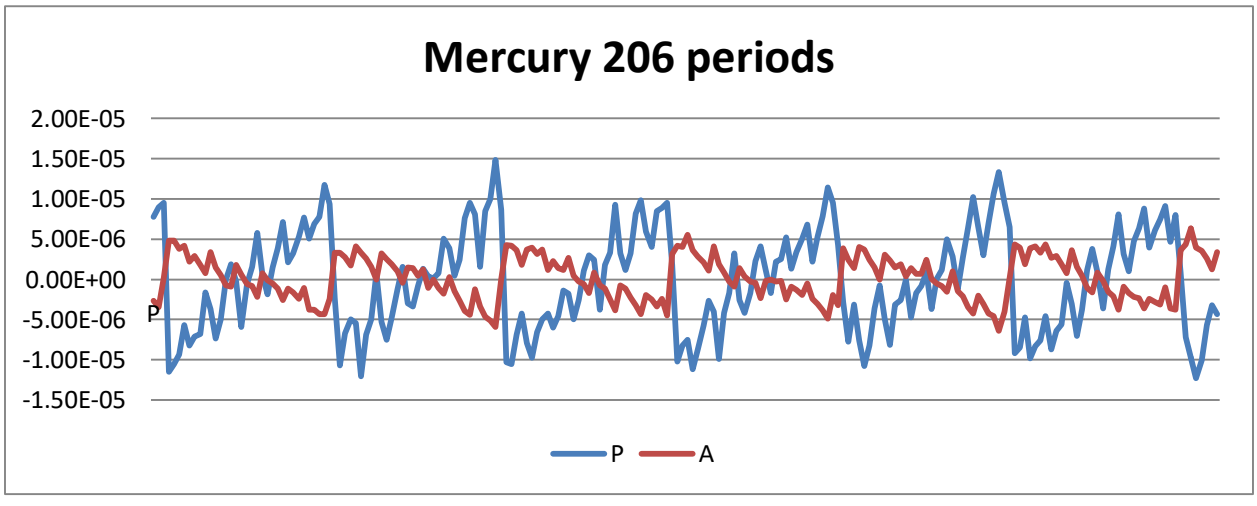


Plot 7

The table of data for plot 7 is represented in the file Mercury_radius_difference1-12.xlsx [5].

Second way

To build a system of objects of a given kind let's consider a sequence of distances between the same points, aphelion and perihelion. Let's take the difference in distances for the given point in consecutive periods., plot 8.



Plot 8

P - difference in distances for perihelion, P_2 - P_1,..., P_n - P_{n-1}

A - difference in distances for aphelion, A_2 - A_1,..., A_n - A_{n-1}

The table with data for the plot 8 is represented in the file mrdppdaa.xlsx [5].

Conclusion

Same results can be obtained when astronomic tables from PADC [6] are used. The data format differs from the NASA one that's why the parsing part is different [7].
To describe the physical sense of the plots some experiments have to be done.

References

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