Astronomical & Astrophysical Transactions
The Journal of the Eurasian Astronomical Society

On the possibility of an asteroid classification by means of a circular orbit obtained with the use of its single CCD-observation

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ON THE POSSIBILITY OF AN ASTEROID CLASSIFICATION BY MEANS OF A CIRCULAR ORBIT OBTAINED WITH THE USE OF ITS SINGLE CCD-OBSERVATION

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In our terminology "a single CCD-observation" of a celestial body means the positional observation of its topocentric coordinates (alpha, delta) and its angular rates (alpha-dot, delta-dot) referred to a fixed moment UT. We have a practice of using such CCD-observations of asteroids for circular initial orbit determinations by means of our AMP-application package. Recently we processed data of CCD-observations and nearly 900 celestial objects obtained by the Spacewatch Telescope of Stewart Observatory on Kitt Peak in May 1991 were classified on asteroid families, streams and trends (Bykov and Komarov). We believe that our circular orbits are valid at least within the range of $e = 0.2$. We should distinguish exactly the elliptical or circular movement of celestial bodies if the angular accelerations were available from their CCD-observations.

The brief and compressed results of our classification of asteroids presented in "data91.may" by Dr. D. Rabinowitz are presented in Table 1. It has two entries (the circular radius r and the inclination i) and shows the number of asteroids having these parameters in the observational set considered by us.

We hope to continue the collaboration with our American colleagues for the purpose of the application of our results to classify the asteroids directly in real time through CCD-observations. We are ready to carry out orbital calculations with any CCD-observations of asteroids for the further improvement of the Pulkovo AMP-method.

We present a summary of the results of classification of nearly 900 objects on asteroid families, streams and trends.

Table 1

r AU	inclination i (in degrees)													sum
	1	3	5	7	9	11	13	15	17	19	21	23	> 26	
1.05	1	1	–	–	–	–	–	–	–	–	–	–	–	2
1.3	–	1	3	4	1	1	–	–	–	–	–	–	–	10
1.6	–	–	–	–	5	1	4	1	1	–	–	–	–	12
1.9	–	4	1	2	1	–	–	–	–	–	–	–	–	8
2.0	–	8	7	3	3	1	–	–	–	1	1	–	–	24
2.2	1	26	47	25	9	5	10	4	1	1	1	–	–	130
2.4	2	18	44	33	21	15	18	12	3	2	1	–	–	169
2.6	4	27	27	31	16	18	12	6	4	3	1	1	2	152
2.8	1	25	29	22	20	15	14	2	3	3	2	3	1	140
3.0	3	11	9	22	11	25	12	6	6	2	1	–	–	108
3.2	2	10	8	11	8	11	7	7	2	1	2	1	1	71
3.4	2	–	5	3	2	4	7	1	–	1	1	1	–	27
3.6	–	–	–	1	2	–	–	–	1	1	–	1	2	8
3.8	–	–	2	–	–	1	–	–	1	–	–	–	1	5
4.0	–	–	–	–	–	–	–	1	–	–	–	–	–	1
4.3	–	–	–	–	–	–	–	–	–	–	–	–	–	–
4.6	–	–	–	–	–	–	–	–	–	1	–	–	–	1
4.9	–	–	–	–	1	–	–	–	–	–	–	–	–	1
5.2	–	–	–	–	–	–	–	–	2	–	–	–	–	2
5.5	–	–	–	2	1	1	–	–	–	–	–	–	1	5
6.0	–	–	–	–	–	–	2	–	–	–	1	–	1	4
6.5	–	–	–	–	–	–	–	–	–	–	–	–	1	1
sum	16	131	182	159	101	98	86	40	24	16	11	7	10	881

References

Bykov, O. P. and Komarov, V. V. *On the Determination of a Circular Asteroid Orbit with the Use of Its Single CCD-observation* (Poster, presented 160 IAU Symposium).