SHORT-TIME ORBITAL EVOLUTION OF THE ASTEROID (523599) 2003 RM. Ireneusz Wlodarczyk, Chorzow Astronomical Observatory, e-mail: astrobit@ka.onet.pl.

Introduction: Based on all published observations, we present computations of the short-period orbital evolution of the asteroid (523599) 2003 RM. It is an Amor type asteroid, Near-Earth Asteroid. Recently, in [1], the study of the orbital evolution of this asteroid appeared. Here we present a calculation of the short-period orbital evolution of this asteroid.

Computation method and results: We based our computation on the published 329 optical observations over an interval: 2003 Sep. 02.45311–2018 Nov. 14.127312: https://minorplanetcenter.net/db_search/show_object?object_id=523599

Only four observations are rejected.

Table 1. Starting nominal keplerian elements of the asteroid (523599) 2003 RM with the error model 'vfcc17' [2]

a=(2.92143617530±2.03)E-8 au
e=(0.6008098479± 4.78)E-8
i=(10.85659027±3.836)E-6 deg
long. node=(336.65149±1.79)E-5 deg
arg. peric.=(324.6377943±2.64)E-5 deg
mean anomaly=(334.51360991±6.74)E-6 deg
Epoch: MJD60000 (2023-Feb.-25.0) TDB
A2=(207.50±5.13)E-14 au/d^2
RMS ast.=0.469"
RMS mag.= 0.543
H=19.743,

where a is a semimajor axis, e – eccentricity, i – orbital inclination, long node – longitude of ascending node, arg. peric. – argument of perihelion, A2 – non-gravitational transverse acceleration parameter, RMSast-uncertainty of the fitted orbit, in arcsec, RMSmag-uncertainty of the absolute magnitude.

To compute orbital elements in Table 1, we used the publicly available OrbFit v.5.0.7 software. We used the error 'vfcc17' model according to [2].

We used the JPL DE431 Solar System model with an additional 17 massive asteroids, as described in [3] and [4].

Together with the orbital elements presented in Table 1, we computed the non-gravitational parameter A2.

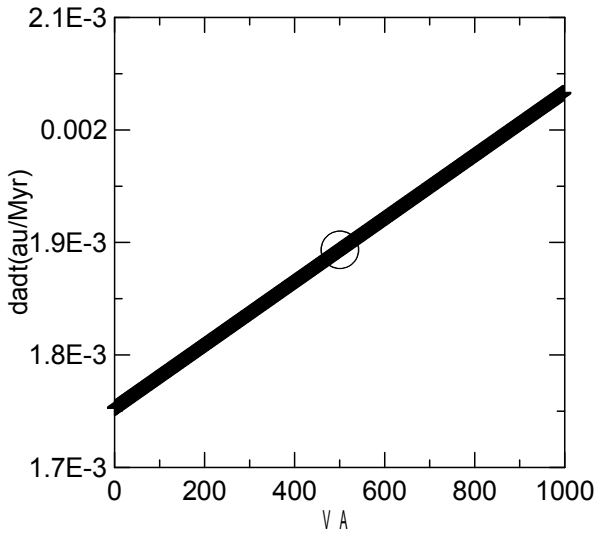

Fig. 1. Computed starting non-gravitational Yarkovsky parameter da/dt of 1001 clones (VAs) of the asteroid (523599) 2003 RM, i.e., for 2023-Feb.-25.0.

To compute clones of the asteroid, we integrated the equation of motions until 2985 Jan. 1. We used the parameter σ_LOV = 3 and calculated 1001 clones (Vas), where σ_LOV denotes the position along the line of variation, *LOV*, in the σ space and values of σ is here in the interval [-3,3],

Close approaches with the planets

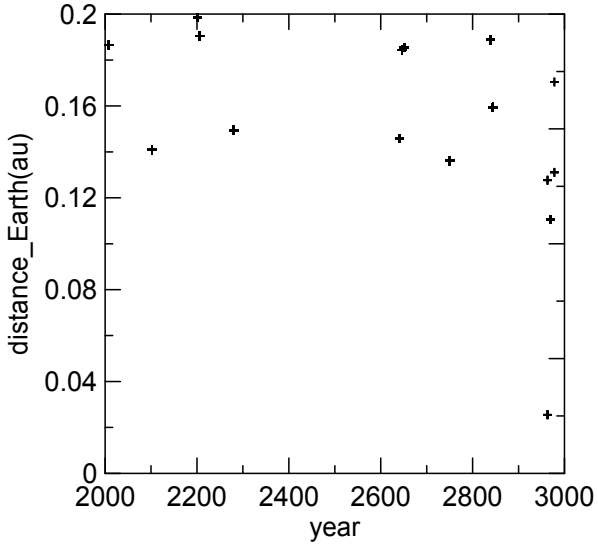

Fig. 2. Close approaches to the Earth.

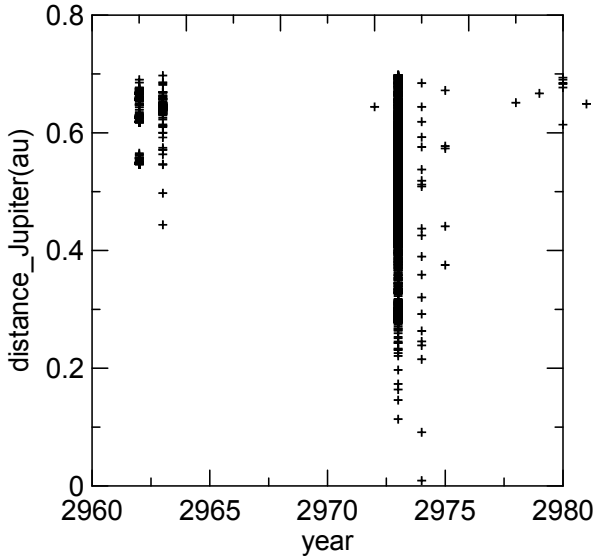

Fig. 3. Close approaches to Jupiter.

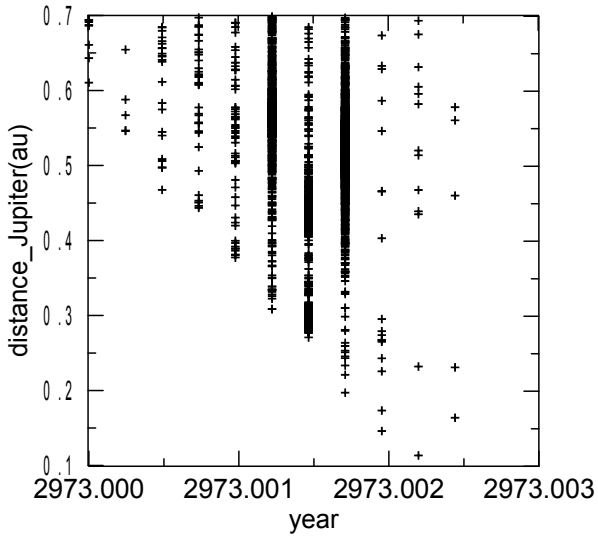

Fig.4. The deepest close approaches to Jupiter.

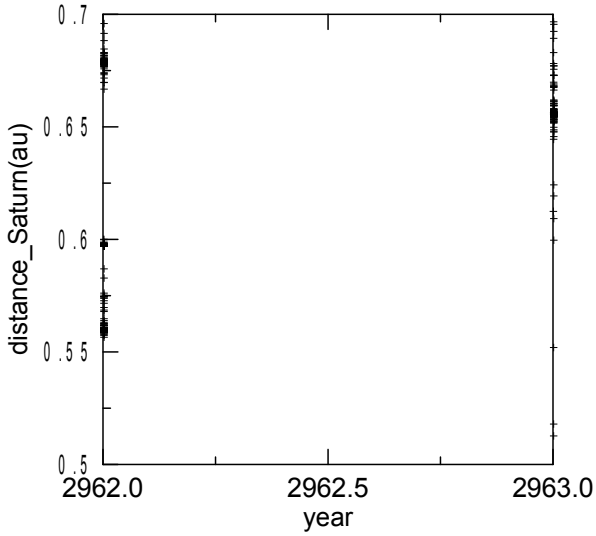

Fig.5. Close approaches to Saturn..

According to Fig. 4, the deepest close approache to Jupiter has clone #340, with the minimal distance to Jupiter equal to 0.113372 au at about 2973.0022. The non-gravitational parameter A2 of this clone is 2.025E-12 au/d^2.

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References:

[1] Farnocchia et al. (2022), arXiv, arXiv:2212.08135 [2] Veres P. et al. (2017), *Icarus*, 296, 139. [3] del Vigna et al. (2018) *A&A*, 617, A61. [4] Farnocchia, D. (2013), *Icarus*, 224,1