

ELLIPTICAL ORBIT OF ASTEROID 1986 QE1

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ABSTRACT

We present the orbital elements of asteroid QE1 (provisional designation) identified in august 26, 1986, on a photographic plate obtained at the GPO telescope of the European Southern Observatory (ESO), La Silla, Chile, as well as the positions (AR and Dec) referred to 1950.0. Residues (O - C) of the position in AR and Dec of the asteroid are given, both before and after applying variation in the geocentric distance.

INTRODUCTION

We have determined 39 positions of the asteroid QE1 (provisional designation), discovered during observations august 26 and september 14, 1986, at the astrometric GPO telescope (D= 40 cm; F= 4 m) of the European Southern Observatory - ESO, La Silla, Chile. Based on such positions, which are referred to the 1950.0 equinox, computations were performed in order to obtain the orbital parameters, through the Gauss-Encke method.

OBSERVATIONAL METHOD

Kodak II a0 plates (16 cm x 16 cm) previously hypersensitized were used. We have employed the classical method of three exposures with displacements in declination and dephasings in time. This method yields an economy both in time and photographic material, also making easier the posterior identification of the celestial bodies in relation to the stellar field.

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Due to the exceptional conditions of atmospheric transparency at La Silla, and to the operation of hypersensitizing the plates, stellar magnitude 18 can be attained with an 8 minutes exposure. The astrometric GPO telescope (D=40 cm; F=4 m) at ESO, La Silla, was utilized in this observational program.

REDUCTION

Obtention of positions

After identifying the five reference stars through the SAO Star Catalogue and the SAO Star Atlas, for which the equinox is 1950.0, we have performed the reduction through the "Uccle five stars" program, using the least squares method (Machado and Debehogne, 1979).

Obtention of orbital elements

The three basic positions for computations were those of 1986 sept. 2.22253, 1986 sept. 4.24684 and 1986 sept. 7.23966. The method of Gauss-Encke, with successive improvements through variations of geocentric distances of the asteroid has yielded the orbital elements (Debehogne, 1964).

The residues O-C in right ascension ($\Delta\alpha \cos \delta$) and in declination ($\Delta\delta$), before and after variation in the geocentric distance, were also listed, for the sake of control.

RESULTS

Positions

Table 1 gives the data in U.T., the positions (AR and Dec) referred to 1950.0, and the residues in AR and Dec, before and after applying the variation in the geocentric distance of the asteroid. Residues are published to show the precision of the results.

Orbital elements

The orbital elements computed from the data in Table 1 are:

Epoch 1986 i 18,0 UT

$$M_0 = -4.32407^\circ$$

$$\Omega = 75.21962^\circ$$

$$\omega = 262.72835^\circ$$

$$i = 2.83621^\circ$$

$$a = 2.251413 \text{ AU}$$

$$e = 0.1604811 \text{ or } \varphi = 9.23482^\circ$$

$$\mu = 0.2917570^\circ/\text{d} = 1050.325''/\text{d}$$

$$T = 1986 \text{ 9 1.820784 (perihelium passage)}$$

$$g = 15.8 \text{ (absolute magnitude)}$$

Direction co-sinus of the coordinate axes are:

$$P'_x = 0.9256684 \quad P'_y = -9.3246528 \quad P'_z = -0.1942640$$

$$Q'_x = 0.3752985 \quad Q'_y = 0.8528788 \quad Q'_z = 0.3629723$$

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