

ON THE EFFECT OF THE SCALE VALUE ON THE PRINCIPAL
NUTATION TERMS DERIVED FROM THE ILS DATA

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The scale values used in the work of the International Latitude Service are known to be in some cases evidently erroneous. After trying various methods to improve these values, E. P. Fedorov (1963) decided on the one based on the computation of the mean latitudes obtained from observations of the pairs with zenith distances of opposite sign.

However, the results derived by this method are subject to the influence of the adopted declinations of the observed stars. Declinations used by E. P. Fedorov were taken from the GC, and we cannot be sure that they are free from considerable errors. This raises a natural doubt as to the reality of the corrections to the mean scale value derived by E. P. Fedorov and, what is more, of his corrections to the coefficients of the principal terms of nutation.

Now more precise declinations obtained by Melchior and Dejaffe (1971) have become available. This enables Fedorov's results to be checked. To obtain a new correction to the mean scale value, we used declinations taken from Melchior and Dejaffe (1971) and repeated, with some small modifications, Fedorov's computations.

Reduction with the new declinations has resulted in changes of the scale value reaching 0".006. However it was found that the coefficients of nutation are affected only very slightly. By harmonic analysis of the averaged non-polar variations of the latitudes of Carloforte, Mizusawa and Ukiah, we have obtained the following expression:

$$F = -0''.0024 \cos(\Omega - \alpha) - 0''.0114 \sin(\Omega - \alpha) \\ - 0''.0029 \cos(\Omega + \alpha) + 0''.0010 \sin(\Omega + \alpha) \quad .$$

We denote the coefficients of the principal terms of nutation in obliquity and longitude by N and M respectively. The corrections to these coefficients that conform to the above expression for F are:

$$\Delta N = -0^{\circ}0124 \pm 0^{\circ}0018 \quad , \quad \Delta M = -0^{\circ}0101 \pm 0^{\circ}0018 \quad .$$

Hence $N = 9^{\circ}1976$, $M = 6^{\circ}8479$.

E. P. Fedorov (1965) has obtained from the same initial data

$$N = 9^{\circ}1974 \quad , \quad M = 6^{\circ}8437 \quad .$$

The discrepancy illustrates the effect of errors of the adopted scale values on the principal terms of nutation derived from latitude observations.

References

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