

β PERSEI, A FUNDAMENTAL STAR AMONG THE RADIOSTARS

Suzanne DEBARBAT
Observatoire de Paris, DANOF/URA 1125
61 avenue de l'Observatoire
75014 Paris

ABSTRACT. Optical fluctuations of the radiostar β Persei are seen from 13 campaigns performed with the astrolabe located at the Paris Observatory.

1. INTRODUCTION

Among the radiostars, β Persei (Algol) - a fundamental star - was chosen by radioastronomers as a zero reference for right ascensions in radioastrometry. Since 1975 this fundamental star has been included in the observing programme performed by the "Astrolabe et systèmes de référence" group in charge of the instrument at the Paris Observatory. The eight first campaigns published have been presented at the IAU Colloquium n° 100 (Belgrade 1987). The average of the mean square errors given were 0.004s in right ascension and 0.13" in declination, according to the FK4 and the constants in use at that time.

2. DETERMINATIONS AND ERRORS

There are now thirteen campaigns available from 1975/76 to 1987/88 and they have been reduced in the FK5 system with the new fundamental constants according to the formulas established by Chollet (1984). Due to the fact that the group and the internal smoothing corrections (according to Débarbat et Guinot, 1970) are not yet available in the case of the FK5, the reduction have been performed for both FK4 and FK5. As an example of residuals, for the zenith distance, to which accuracy this quantity is obtainable when 12 transits (at east and at west) are observed, Table I gives the values for the 1983/1984 campaign (J 2000, FK4 and FK5).

Table I

East residuals FK4	- 0.114" \pm 0.085"	12 transits
J 2000 FK5	- 0.123" \pm 0.096"	
West residuals FK4	+ 0.077" \pm 0.078"	12 transits
J 2000 FK5	+ 0.093" \pm 0.081"	

The residuals are not significantly different when the FK4 and the FK5 quantities are used. Also their mean square errors have the same order of magnitude.

For each of the 13 campaigns (1975/1976-1987/1988), $\Delta\alpha$ and $\Delta\delta$ have been derived, the calculation being made in two cases J 2000, FK4 and J 2000 FK5. The probable errors calculated for each campaign correspond to an average which is the same in the case of the FK4 and in the case of the FK5 : $\pm 0.0058s$ (right ascension), $\pm 0.116''$ (declination).

3. FLUCTUATIONS IN RIGHT ASCENSION AND IN DECLINATION

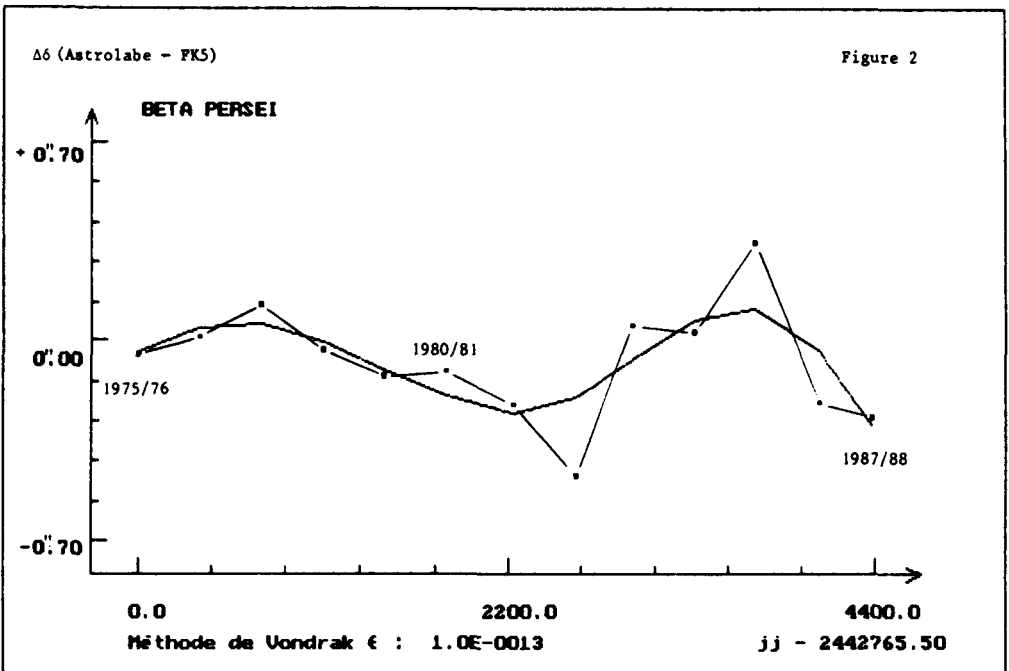
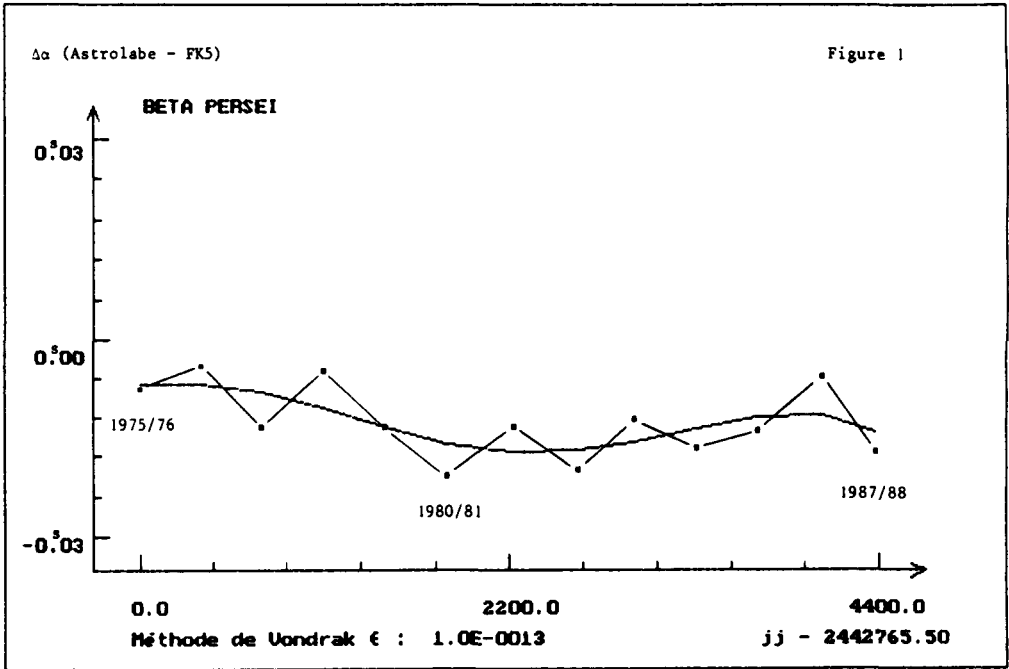
As fluctuations appeared in both coordinates (fig.1 and fig.2), smoothing curves (according to Vondrak 1969) have been determined with the same smoothing factor ; they are reported on figures 1 and 2. The corresponding mean square errors, together with the errors with which the curves are mathematically given, are in Table II.

Table II

	Mean square error	Error of the curve
Right ascension	$\pm 0.0042s$	$\pm 0.0012s$
Declination	$\pm 0.140''$	$\pm 0.039''$

The amplitudes for the fluctuations (0.010s in right ascension, 0.25" in declination) and the associated errors (0.0012s and 0.039") show that the optical variations appears to be real.

The optical positions of this radiostar (which is also a multiple star), no longer used as a zero reference in right ascension, but still an object of interest for radioastronomers and double star specialists, must be compared with VLA and/or VLBI determinations for the same period.



4. CONCLUSION

β Perseï, as a fundamental star among the radiostars will be used for the linkage of the "optical" and the "radio" system of reference. β Perseï represents an example of the problems to which the link will have to face due to the fluctuations this star is showing after 13 years of optical observations.

REFERENCES

- Chollet, F. 1984, *Astron. and Astrophys.*, 132, 296-300.
Débarbat, S. et Guinot, B., 1970, *La Méthode des hauteurs égales en astronomie*, Gordon and Breach, Ed.
Vondrak, J., 1969, *Bull. Astron. Inst. Czeh.* 20, 349.