Long-period magnetic variability of HD 9996

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Abstract. A study of magnetic behaviour of the long-time period of the star HD 9996 is being continued. The obtained magnetic measurements allowed us to refine the period of "secular variability" — 21.5 yrs.

The star HD 9996 (HR 465, GY And) is known as one of the long-period Ap stars. Compilation of photometric measurements for the star made it possible to establish that its period ranges from 7750 to 8550 days, i.e. about 20 years. Magnetic field measurements of HD 9996 were initiated by Babcock (1958) then continued by Preston & Wolff (1970), Scholz (1978; 1983). 49 photographic estimates have been made for nearly 34 years. With the aim of specifying the magnetic behaviour of this object, in the frames of investigation of the magnetic behaviour of Ap stars in the Special Astrophysical Observatory, Nizhnij Arkhyz, magnetic measurements at the 6 m telescope using the hydrogen-line magnetometer (Shtol', 1991; 1993) have been started. We present the obtained data for HD 9996 in Table 1. Thanks to our data the time of magnetic monitoring has increased to 48 years. In Fig.l we show all magnetic field measurements as according to time. It is seen from the figure how widely varies the time between measurements, which makes it difficult to analyze the variability. Using the magnetic field estimates available, an attempt has been made to refine the period. A period of 7842 ± 60 days (21.5 years) turned out the most likely. The phase magnetic curve with this period is displayed in Fig.2. As is seen from Fig.2, the curve has rather a non-uniform filling over the phases, and at phase 0 it has quite a large scatter of points. The magnetic variability is mainly of harmonic character, but apparently, there are deviations from harmonic behaviour and the magnetic curve may be more complicated. Therefore it is extremely important to continue magnetic monitoring, which will make it possible to finally establish the character of the magnetic behaviour. Under the assumption that the relation is sinusoidal the parameters are expressed by the following formula:

Table 1:

JD	B_e,G	σB_e, G
2448959.189	- 1750	310
48966.318	- 1580	600
48994.425	- 1760	390
49028.327	- 1490	340
49317.458	- 1360	290
49318.517	- 1150	320
49381.194	- 1690	310
50297.472	- 940	250

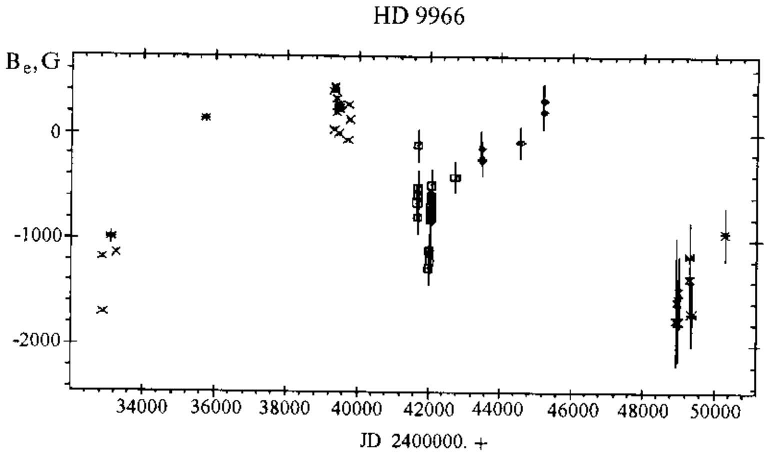

Figure 1:

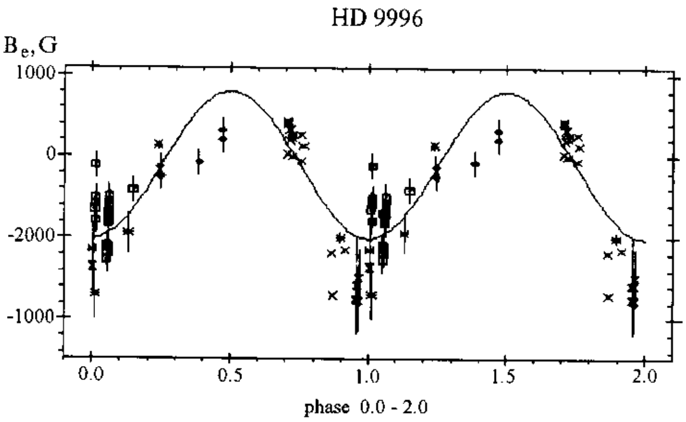

Figure 2:

$B_e(t) = B_0 + B_1 \sin(2\pi(t - T_0)/p)$,

where

B_0 — **-86 ± 36** G — constant component,

B_1 = **916 ± 45** G — half-amplitude of variability,

T_0 = **2433783.0** — initial epoch,

p = **7842.** day — period.

The root-mean-square magnetic field estimate $< B_e >$ derived from **57** estimates by the procedure proposed by Borra et al. **(1983)** is $< B_e > =$ **833 ± 204** G.

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