

Oblique rotator with inhomogeneous and symmetrical surface distribution of chemical elements

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The work is done within the framework of investigations whose purpose is searching for a scenario of origin of strong global magnetic fields of Ap stars. This study is aimed at obtaining the utmost correct angles of inclination of the magnetic dipole axes to axes of rotation for maximally possible number of stars.

For solving the problem we have:

1. A complete collection of observed phase magnetic curves of Ap stars (Bychkov et al. 2005). An example of such curves is shown in Fig 1.

2. Physical parameters of the stars under investigation, which were collected from literature or determined by standard techniques.

3. The standard oblique rotator model of Stibbs – Preston (Shwarzchild 1950, Stibbs 1950, Preston 1967).

4. The code for computation of Stokes parameters for peculiar stars with a given magnetic field and inhomogeneities of the distribution of chemical elements over their surface (Lebedev, 1980), see Fig. 2.

We need:

1. To compute phase curves of a magnetic field for all combinations of input parameters.
2. To choose models describing observations best.
3. To study ambiguities of such a choice.
5. To investigate the statistics of distribution of orientation angles of magnetic dipoles and their magnetic moments.

Attention should be paid to the fact that “complex” unharmonic magnetic curves can arise also in the model of simple central dipole as a consequence of “spot” distribution of chemical elements

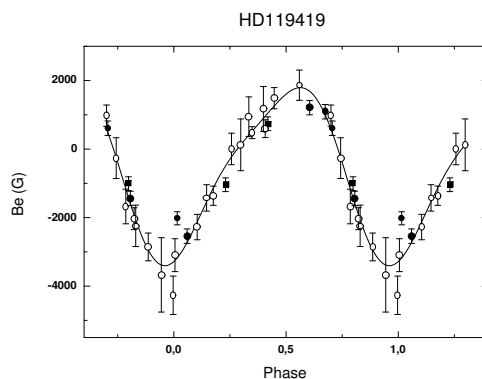


Figure 1: Magnetic curve of the chemically peculiar star HD119419 vs. rotation phase.

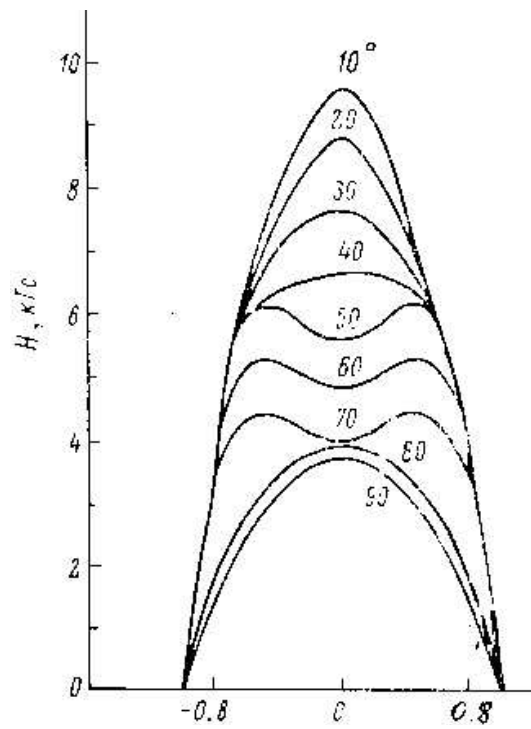


Figure 2: Magnetic curve vs. different parametr of models.

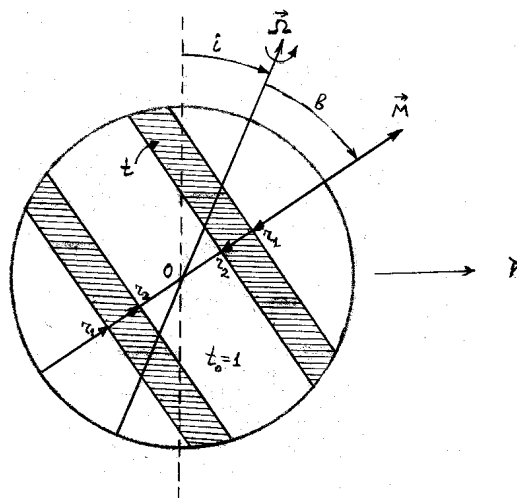


Figure 3: Schematic model of a star surface.

over the star surface (Fig. 3). This can change the percentage of stars with a complex magnetic field structure, which currently amounts to 13 % (Bychkov et al. 2005).

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