Be-star discs and non-radial pulsations in rotating stars

Telting, J.H.

Citation for published version (APA):
Contents

Part I  Be-star discs

Chapter 2  Long-term changes in emission line and continuum spectrum of the Be star γ Cassiopeiae: Hβ V/R and IR continuum flux variations

1. Introduction
2. γ Cassiopeiae
3. The data
4. Description of general trends
5. Two models that may explain long-term V/R variability of Be stars and their consequences for the IR energy distribution
   5.1. Spherical shell model
   5.2. Non-axisymmetric disc model
6. Photospheric flux
   6.1. The photospheric flux of γ Cas
   6.2. Comparison with B0.5 type stars
7. Modelling and fitting the IR excess
   7.1. The curve of growth model
   7.2. IR colours of γ Cas
   7.3. Fitting COG models to the IR data of γ Cas
8. Discussion and conclusions

Chapter 3  Long-term periodic variability in UV absorption lines of the Be star γ Cassiopeiae: on the relation with V/R variations in the Hβ line

1. Introduction
2. Observations and reduction
3. Analysis of the UV spectra of γ Cas
4. Modelling DACs in resonance lines of γ Cas
   4.1. Modelling discrete absorption components
   4.2. Fitting the model
Chapter 4  Observational evidence for a prograde one-armed density structure in the equatorial disc of a Be star

1. Introduction 41
2. Observational discrimination between prograde and retrograde precession of global disc perturbations 43

Chapter 5  The equatorial disc of the Be star X Persei

1. Introduction 45
2. The data 47
3. Description of the light curves 49
4. The stellar photospheric flux of X Per 51
5. Modelling and fitting the IR excess 52
5.1. The curve of growth model ........................................ 52
5.2. The fits .......................................................... 53
5.3. Fit results ......................................................... 54
6. Discussion 56
6.1. The density distribution of the equatorial disc in X Per .................................................. 56
6.2. Disc rise and fade; the disc as a reservoir .................................................. 57
6.3. X-ray luminosity .................................................. 57
7. Summary of conclusions 58

Part II  Non-radial pulsations in rotating stars

Chapter 6  Line-profile variations of non-radial adiabatic pulsations of rotating stars.
I. Observable characteristics of spheroidal modes

1. Introduction 61
2. Surface velocity field of adiabatic pulsations 62
2.1. Basic equations .................................................. 62
2.2. Description in the limit of no rotation .................................................. 63
2.3. Velocity field of adiabatic pulsations of a rotating star .................................................. 63
2.4. An expression for $k$, correct to the first order in $\Omega/\omega^{(0)}$ .................................................. 64
2.5. Verification of the derived expression for $k$ for a polytropic model .................................................. 65
3. Line-profile synthesis .................................................. 65
4. Diagnostic tools for the analysis of line-profile variability 65
4.1. Morphology of amplitude and phase distribution across the line profile .................................................. 66
4.2. The moment variations .................................................. 67
5. Relevant domains in parameter space
5.1. Rotation and $\Omega/\omega^{(0)}$ ................................................................. 67
5.2. Prograde and retrograde modes .......................................................... 67
5.3. The inclination angle $i$ ........................................................................... 67
5.4. The use of $V_{\text{max}}$ instead of $a_{\text{ph}}$ .................................................... 67
5.5. The use of $V \sin i$ as a scaling factor ....................................................... 67
5.6. The ratio $k^{(0)}$ of the horizontal to the vertical amplitudes .......................... 67

6. Results
6.1. Line-profile variations with the pulsation frequency and its harmonics ............ 68
6.1.1. The amplitude distribution at harmonic frequencies ............................. 68
6.1.2. Determination of $\ell$ and $|m|$ from the phase differences across the line profile 68
6.2. The effects of rotation on the line-profile behavior .................................... 69
6.3. The difficulty to derive $k$-values from amplitude diagrams .......................... 70
6.4. Amplitudes of line-profile variations of tesseral modes .............................. 70
6.5. Retrieval of the inclination ....................................................................... 70

7. Conclusions .............................
Chapter 9  
A period analysis of the optical line variability of β Cephei: evidence for multi-mode pulsation and rotational modulation

1. Introduction
2. The data
3. Period analyses
   3.1. Description of the methods
   3.2. Results of the period analyses
      3.2.1. Variations in the moments
      3.2.2. Variations in the normalized intensity as a function of position in the line profiles
4. The non-radial mode in β Cep
   4.1. The moment method
   4.2. IPS diagnostics; the phase diagram of $f_2$
      4.2.1. The IPS amplitude and phase diagram of $f_1$ and $f_2$
   4.3. Moment method versus IPS method
5. Interpretation of the frequency splitting
   5.1. Rotational modulation; temperature spots
   5.2. The oblique pulsator model
   5.3. More detailed modelling
6. Concluding remarks

Samenvatting

1. Equatorial scheijven rond Be-sterren
   1.1. Visueel en infrarooi continuum
   1.2. V/R variabiliteit
   1.3. Discrete absorptiecomponenten
   1.4. Schijfpulsaties
   1.5. Samenvattend ...
2. Niet-radiële pulsaties in vroeg-type roterende sterren
   2.1. Identificatie van pulsatiemodes
   2.2. Concluderend ...

Echt heel erg tof van jullie!

1. Thanks!