A statistical study of pulsating stars

Fourteenth paper: *Irregular variables in ω Cen.*

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Abstract. In the course of the study which has been carried out in the present Series of papers, the position of the irregular variables in the correlation plane log P-A (2) appeared to be a peculiar one. The number of irregular variables investigated up till now was insufficient accurately to fix that position. Of the variables in ω Cen. many are of the irregular type. In order to obtain additional information about this type, the present author has analysed a number of these irregular variables. Such systems were selected for which several light curves for different epochs are available.

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Özet. Bu seri makalelerde yapılan çalışmalarda, gayrımuntazam değişen yıldızların, log P-A (2) korelasyon düzleminde durumları bir hususiyet arzetti. Şimdiye kadar araştırılan gayrımuntazam değişen yıldızların sayısı bu durumu doğru olarak tespit için kâfi değildir. Cent. deki değişken yıldızların birçoğu gayrımuntazam değişen tiptir. Bu tipe ait daha fazla malûmat elde etmek için, yazar bu değişen yıldızlardan bir kısmını tetkik etmiştir. Muhtelif tarihlere tekabül etmek üzere birkaç ışık eğrisi olan sistemler seçilmiştir.

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The veriables analysed in this paper were taken from the list of variable stars in ω Cen. published by *W. C. Martin* [1]. Only such systems were selected for which *Martin* has noticed a substantial change in the shape of the light curve and for which the period does not seem altogether constant. An additional condition for our choice has been that several light curves had to be available, each valid at different epochs. Presumably the variables considered in this paper therefore largely are associated with the stars of the RW Draconis type. The method of analysis which has been applied is the same as that used in all previous papers of this series, but some simplifications have been introduced.

In the thirteenth paper of this series *E. A. Kreiken* has evaluated the amount of probable error affecting the values A(f) which give the relative intensities of the various overtones. The sequence of numbers which represent the series of tones A (1); A (2); A (3) — A (f) starts with the value A (1) = 1.000 and then rapidly diminishes with increasing values of f. Already with A (3) the probable error expressed in percentages of the mean value A (3) is large.

With the overtone A (4) the probable error is of the same order of magnitude as A (4) itself. Statistically therefore only the values A (2) are of importance.

Consequently in this paper only the values π (1) and A (2) are given. For the meaning of these symbols the reader is referred to the first paper of this series. All variables which have been considered in this paper are collected in Table 1, in which they are arranged in order of increasing periods. The number in the first column by which the variable is indicated, refers to the catalogue of *Martin*. The second column indicates which particular light curves of the variable have been analysed. For each variable this were two light curves. The remaining columns give the value log P, π (1) and A (2).

Except for No. 58 all variables contained in this table have been indicated by *Martin* as being irregular. The maximum in their light curves is not constant, high and low maxima alternate. Presumably these variables therefore are closely associated with those of the R W Draconis class.

Variable No. 58 is classified as a *c* type variable and this explains the low values which are obtained for A (2). Its period seems to be slightly variable, but there is no evident reason also to associate this variable with the R W Draconis class.

When considering the table, it is evident that in this case also the irregular variables are limited to a fairly narrow interval in period of which the limits are around log P = — 0.40 and log P = — 0.20. Only one of the variables has a period outside these limits. The range through which the values A (2) oscillate through the secondary cycle in some cases is considerable. It is to be observed that the ranges indicated in our table do not necessarily represent the maximum ranges. This would only be the case if the two light curves which have been analysed for each variable correspond to the highest and lowest

maximum respectively. We have no certainty that this condition is met by the actual observations.

The mean values A (2) usually are around the level *a* 1, but at minimum A (2) can be considerably below that level. However, in no case does the variable move down to a point on or near the levels *c*.

TABLE 1.

Irregular variables in ω Cen.

The light curves were taken from the work by **Martin**, the numbers in the first column are the numbers in his catalogue. Variable No. 58 has a light curve of the Bailey subtype *c*. While the other variables in this table presumably are all associated with the R W Draconis type No. 58 may be an exception.

No.	curve	log P	π (1)	A (2)	No.	curve	log P	π (1)	A (2)
58	1931	$\bar{1}$.568	.095	0.01	56	1931	$\bar{1}$.754	.69	.50
	S		.94	.02		S		.72	.43
112	1931	$\bar{1}$.676	.68	.44	73	1931	$\bar{1}$.760	.82	.35
	H		.69	.46		S		.75	.44
5	S	$\bar{1}$.712	.74	.43	45	S	$\bar{1}$.770	.70	.44
	1931		.74	.43		1931		.77	.48
59	1931	$\bar{1}$.715	.81	.48	4	S	$\bar{1}$.797	.73	.39
	H		.78	.43		1931		.75	.43
9	1931	$\bar{1}$.719	.79	.42	115	1932	$\bar{1}$.799	.76	.54
	H		.81	.37		S		.74	.48
120	1931	$\bar{1}$.739	.74	.48	69	1931	$\bar{1}$.815	.76	.45
	H		.75	.43		S		.73	.47
67	1931	$\bar{1}$.751	.76	.48					
	S		.73	.51					

Literature

[1] Martin. Cω; Annalen Leiden 17.2.1938

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