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INTERNAL CONSISTENCY TEST ABOUT δm_1 METALLICITY INDEX FOR SX Phe AND HIGH AMPLITUDE[1] δ Sct STARS

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RESUMEN. Se ha realizado un estudio sistemático del comportamiento del índice de metalicidad δm_1 para las estrellas tipo SX Phe y δ Sct de gran amplitud. Este índice se comporta de forma diferente para las dos muestras de estrellas. El parámetro δm_1 aumenta o decrece hacia el mínimo de luminosidad para la primera o segunda muestra, respectivamente. La variación del índice m_1 es mayor cuanto menor es la abundancia metálica de la estrella.

ABSTRACT. We have carried out a systematic study of the behaviour of the δm_1 metallicity index for SX Phe and high amplitude δ Sct stars. It is shown to be different for the two samples of stars. The δm_1 parameter increases or decreases towards the minimum light for the first or second sample, respectively. The m_1 index variation is larger when the metal abundance of the star is smaller.

Key words: PHOTOMETRY — STARS-DELTA SCUTI — STARS-VARIABLE

In uvbyβ photometric system the δm_1 parameter is used to obtain abundances for A-F stars. If the metallicity don't change over the pulsation cycle of the star, δm_1 must remain constant. It provide us for a test of internal consistency.

We have carried out a systematic study about the behaviour of the δm_1 index for SX Phe (SX) and high amplitude δ Sct (δ) stars. In Figure I is shown the observed δm_1 variations versus β variations over the pulsation cycle for two SX Phe (KZ Hya and CY Aqr) and two high amplitude δ Sct stars (RS Gru and RY Lep). It is shown that δm_1 increases towards the minimum light for the first two stars but the behaviour is very different for the last two ones.

Table I reassumes the results obtained for the sample of stars. Column 4 presents mean value for δm_1 index and in column 5 are listed the observed variation for the m_1 index. For homogeneity, we have calculated the values for the $\Delta\delta m_1^*$ parameter. It is defined as the ratio between $\Delta\delta m_1$ and the observed β variation (in tenths of a magnitude) over the cycle ($\Delta\delta m_1^* = \Delta\delta m_1 / \Delta\beta\ (0^m.1)$). These values are listed in the last column in Table I. In this column, the mark (+) means that the observed m_1 variation is larger that the expected variation from the change in temperature. The mark (-) have the opposite meaning. (1) is from Rodríguez et al. (1988), (2) is from Breger (1980). The results obtained by Breger (1980) for the stars AD CMi and RS Gru agree with the ones obtained for these two stars by us.

From this table is shown that for the majority of the stars the internal consistency test about δm_1 fails. On the other hand, the behaviour for δm_1 is different for the two samples. The δm_1 parameter increases or decreases towards the minimum light for the SX Phe or high amplitude δ Sct stars, respectively. Moreover, the m_1 index variation is larger when the metal

[1] Partially based on observations collected at European Southern Observatory, La Silla, Chile and by using the 1.5 m telescope from the Observatory Astronómico Nacional (I.G.N.) at Calar Alto Observatory, Almería, Spain.

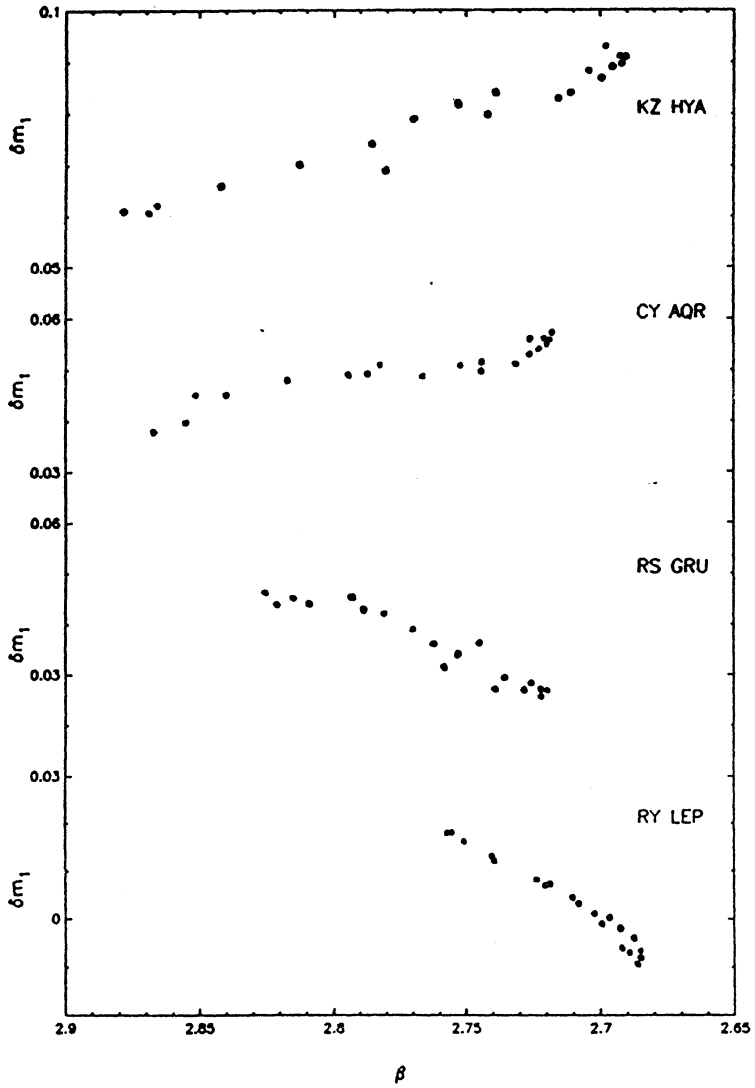

Figure I. Observed variation of δm_1 versus β over the cycle of pulsation

TABLE I. Test for δm_1 index

Star	Type	Period (d)	δm_1	Δm_o	$\Delta\delta m_1^*$
BL Cam	SX	0.0391	0.097	0.056	+0.050
SX Phe	SX	0.0550	0.07	0.04	+0.01
KZ Hya	SX	0.0595	0.079	0.066	+0.020
CY Aqr	SX	0.0610	0.050	0.050	+0.010
DY Peg	SX	0.0729	0.046	0.030	+0.000
GP And	δ	0.0787	0.040	0.024	−0.015
HD 79889	δ	0.0958	0.034	0.022	−0.005
AD CMi	δ	0.1230	0.006(1)	0.009(1)	−0.02(1)
XX Cyg	SX	0.1349	0.053	0.034	−0.001
RS Gru	δ	0.1470	0.035	0.013	−0.020
DY Her	δ	0.1486	0.00(2)		−0.02(2)
VZ Cnc	δ	0.1784	0.01(2)		−0.02(2)
RY Lep	δ	0.2254	0.004	0.011	−0.030

abundance of the star is smaller.

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