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SEARCH FOR ULTRA SHORT PERIOD VARIATIONS IN EPSILON OCTANTIS

Recently Smith (1983) reported ultra short period oscillations with periods in the order of 100 minutes for the irregular red variables Arcturus and Alderbaran, but cast some doubt whether the observed variations could be considered analogous to the 5 minute solar oscillations. It is suggested that discovery of short period nonradial modes of pulsation in late type stars may provide an insight into convection in stellar envelopes, unfortunately considerable efforts are required to survey likely candidates in an effort to ascertain if such oscillations exist, their amplitudes of variation, and the periods present. Such nonradial oscillations are likely to be of very small amplitudes, generally below the detection limit of photoelectric photometry. However, it is perhaps worthwhile to attempt precise differential photoelectric photometry on some late type stars.

TABLE I

ε Oct				β Oct − ξ Oct		
HJD (2445000+)	V (± 0.02)	B−V (± 0.02)	V−R (± 0.02)	ΔV	Δ(B−V)	Δ(V−R)
466.077	4.61			-1.17		
473.068	4.58	1.41	1.55	-1.18	0.34	0.25
475.070	4.59	1.43	1.59	-1.17	0.34	0.26
503.063	5.06	1.53		-1.21	0.34	
520.081	5.05			-1.18		
534.166	5.18			-1.18		

The bright M5 giant ε Oct (= HR 8481 = HD 210967) was discovered to be a semiregular red variable by Eggen (1973), and found to vary by about 0.4 magnitude in approximately 50 days. Using the 0.25 m and 0.4 m telescopes of the Monash observatory, ε Oct was observed on six nights from May to July 1983. As different photomultiplier tubes and filters were used, the necessary standardizations were performed to transform magnitudes and colours to the standard UBVRI system. Average magnitudes and colour indices for ε Oct on each night are given in Table I; also included are the magnitude and colour index differences between nearby comparison stars β Oct (= HR 8630) and ξ Oct (= HR 8663). The quoted errors of ± 0.02 magnitude account for transformation errors as well as observational uncertainty. Measured magnitudes and colours for β Oct and ξ Oct, transformed to the Johnson UBVRI system, are given in Table II.

From Table I it is apparent that ε Oct dimmed in V-light by about 0.5 magnitude from HJD 2445473 to HJD 2445503 with a corresponding B-V change of about 0.1 magnitude. Using the B-V, T_e calibrations for red giants given by Böhm-Vitense (1981), this B-V change indicates that ε Oct cooled from about 3890 K to 3760 K over the 30 day interval.

TABLE II

Star	B-V	V	V-R
β Oct	0.20	4.14	0.18
ξ Oct	-0.14	5.34	-0.08

On 1983 July 18 ε Oct was observed with the 0.4 m telescope for five and a half hours; being of similar B-V to ε Oct, HR 8577 (= HD 213402) and HR 8810 (= HD 218559) were chosen as comparison stars. Results for this session are given in Figure 1; no variations are observed which can be attributed to ultra short period oscillation of ε Oct. The dashed lines give average magnitude differences observed. It is worth noting that the rms scatter of ± 0.005 magnitude forms an upper limit for any ultra short period pulsations of this star.

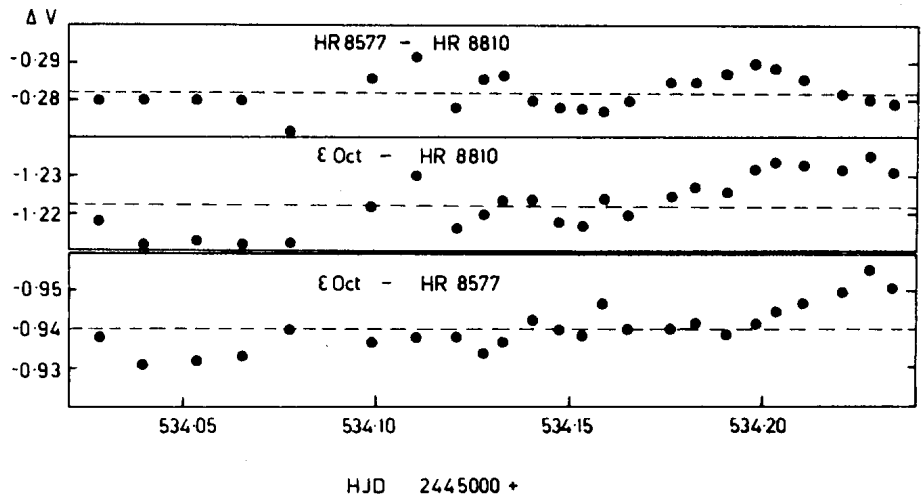

Figure 1

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