

ON THE IRREGULAR LIGHT VARIATION OF THE RV TAU STAR R SCUTI

Z. Kollath

Konkoly Observatory, Budapest, Hungary

G. Kovacs

Konkoly Observatory, Budapest, Hungary

Abstract. The nature of irregular light variation in giants and supergiants has long been a matter of dispute. Our lack of understanding has two main sources: (i) a paucity of long, continuous, high quality observations and thorough analysis of the available data and (ii) until very recently, a lack of systematic nonlinear hydrodynamic studies for these stars.

The recent finding of Buchler and Kovacs (1987, *Ap.J.*, 320, L270) that irregular behavior of pulsation models in the RV Tau regime is simple (i.e. low dimensional) chaos and results from period-doubling bifurcations, stimulated our present study.

One hundred and thirty-two years of visual observations of R Sct (compiled by Mora, 1934, *Mitt. der Sternwarte Budapest*, 3, 1) were studied with various techniques of modern time-series analysis. Power spectra indicate nonstationary behavior with irregularly spaced peaks around $P = 142$ days and $\frac{1}{2} P$. (O-C)-curves for the moments of light minima also show irregular variation with some phase jumps. Phase-space reconstruction together with the correlation dimension indicate that the corresponding dynamical system can be embedded in low-dimensional (< 5) phase-space. We suggest that the light variation is a result of a chaotic oscillation determined by a low-dimensional dynamic system.

The present analysis will be extended (Kollath, 1988, in preparation) by more data, including the new data published by the AAVSO (Mattei et al. 1988, *A.A.V.S.O Monograph* 3).