# PERIOD DOUBLING IN VARIABLE STARS: A TENTATIVE INTERPRETATION OF OBERVED LIGHT CURVES OF VARIABLE WHITE DWARFS AND MIRA STARS

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Abstract. Irregular pulsations are commonly observed in many groups of pulsating stars. An interpretation in terms of superposition of modes of pulsation is sometimes barely convincing when too many modes have to be considered and when unexpected ratios of frequenceis are observed.

The idea is thus to attribute some of those irregularities to basic purely nonlinear mechanisms, generators of chaos. This is supported by the results of Buchler et al. (1987, Ap.J.,320, L57) who have found series of numerical models of W Virginis stars undergoing a cascade of period doubling bifurcations when the effective temperature is decreased. Such a process is a classical route to chaos encountered in very different, simple or complex, nonlinear dynamical systems. It is therefore likely to occur in variable stars.

The analysis of three variable white dwarfs (Goupil, Auvergne & Baglin 1988, Astron. & Astrophys.,196, L13 and in preparation) reveals the existence of subharmonics in their power spectra which constitutes a first indication that those stars have undergone period doubling bifurcations. A preliminary analysis of a Mira star indicates a similar behavior.

Specific nonlinear methods of analysis (such as return maps and dimension computations) are necesary to confirm these conclusions. However, these require long series of data of very high signal to noise ratios which are not yet available. Programs of observatons devoted to this aim are in progress.

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