A survey of RR Lyrae models

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Abstract

An extensive grid of non-linear pulsating models of RR Lyrae stars have been computed. To simulate the outer regions of these variables a non-local and time-dependent treatment of convective transport has been adopted. In this poster we briefly describe some new features of the instability strip (IS).

1. Discussion

In order to derive the IS for the fundamental (F) and first overtone (IO) three different sequences of models have been computed at $logL/L_o = 1.8, 1.7, 1.5$. The steps in temperature lie between 100 and 300 K. The chemical composition (X=.7, Z=.001) and the mass ($M = .65M_o$) are fixed for all models. For all cases the pulsation has been followed until the limiting amplitude behaviour of the model can be surely identified (the number of periods directly integrated ranges between 500 and 6000). The Figure 1 shows the non-linear instability strip for the F and IO. This figure presents some interesting results: 1)the large difference between the non-linear radiative IO blu edge and the convective one confirms that the convection shifts the blu boundaries toward lower temperatures; 2)the extension of IO region (only the IO results unstable) and of the OR region (the F and IO are unstable) is more in agreement with the observational counterpart; 3)the red edge of the IO has been computed at limiting amplitude for the first time, confirming that the convection is the quenching mechanism of the pulsation both for the F and IO; 4)the new location of the F blue edge and of the IO red edge could be the key parameter for several open astrophysical problems like the Oosterhoff dicotomy and the Sandage period-shift effect.

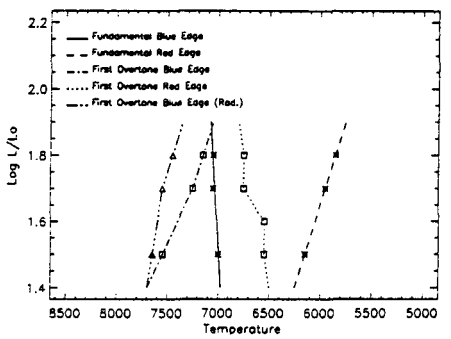

Figure 1 Non-linear instability strip, for more detalis see text.

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