The Effect of a Vertical Magnetic Field on the Periods of Trapped g-modes in White Dwarfs

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Abstract

A white dwarf model with cylindrical symmetry is used to investigate the effect of a uniform vertical magnetic field ($\vec{B} = B_o \hat{z}$) on the periods of g-modes trapped in the compositionally stratified surface layers. For those modes for which trapping is most effective, the periods wander by approximately 10% about their zero-field values as B_o increases. As the field strength increases further, the period may abruptly increase by some 25% to a new, more stable value; see Figure 1. The periods of less efficiently trapped modes do not show this sensitivity for field strengths up to 1 MG, the upper limit examined.
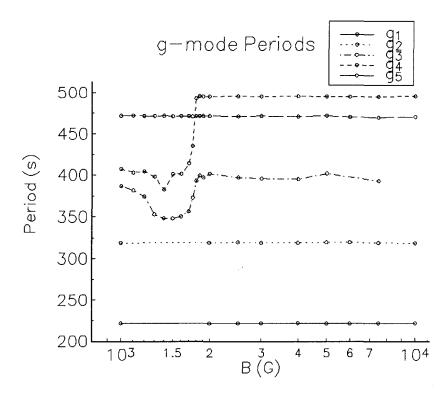
Figure 1 Pulsation periods of $g_1 - g_5$ modes with $\ell = 2$ for a compositionally stratified 0.6 $M_\odot$ white dwarf model ($T_e = 9960$ K, $M_{\mathrm{He}}/M_* = 10^{-5}$, $M_{\mathrm{H}}/M_* = 10^{-10}$)

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