I T1 Asteroseismic signatures of helium gradients in the Main-Sequence A-stars: Application to the roAp Star HD 60435

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Asteroseismology is found to be an excellent tool for detecting diffusion-induced helium gradients inside main-sequence A stars. Models have been computed for 1.6 and 2.0 $M_\odot$ stars with pure helium diffusion, at different ages, so that the helium gradient lies at different depths inside the star. The adiabatic oscillation frequencies have been analysed and compared with those of a model without diffusion. Clear signatures of the diffusion-induced helium gradient are found in the so-called"second differences": these frequency differences present modulations due to the partial reflexion of the sound waves on the layer where the helium gradient takes place. A tentative application to the roAp star HD60435, which presents enough detected oscillation frequencies for the test to be possible, gives evidence of the helium gradient in the magnetic polar regions at a fractional radius $r/R_* = 0.9$. This result is consistent with the idea that the triggering of the oscillations is due to the hydrogen κ-mechanism.