SOLAR-LIKE OSCILLATIONS IN LATE SPECTRAL CLASS STARS

Arthur N. Cox
Theoretical Division
Los Alamos National Laboratory

Julius H. Cahn
Astronomy Department
University of Illinois

Abstract. There is interest in the minimum mass that can exhibit solar-like nonradial p-mode oscillations. Inspection of models for the solar case shows that there is approximately equal pulsational driving and damping due to the standard radiative effects. It is widely believed that coupling with surface convective elements occasionally tips the balance by strongly driving modes for a few days with the timescale of the convection at the top of the convection zone. Then both the convection and the radiative damping decrease the mode amplitude at the observed decay rate, (which is close to that calculated by Kidman and Cox (1984)) until the next convective reexcitation. Population I composition stellar models at 0.30, 0.45, and 0.75 solar mass have been constructed to see if the near equality of radiative driving and damping exists in them also. If so, then stars down to late spectral class could possibly display solar-like oscillations. We find that the convection timescale decreases to less than 100 seconds at 0.30 solar mass, but the near equality of radiative driving and damping occurs only down to about 0.5 solar mass. Thus there is the possibility that 100 to 300 second oscillations can be observed through most of the K spectral class, if the magnetic activity often seen in these stars does not overwhelm these small amplitude nonradial pulsations.

https://doi.org/10.1017/S0252921100011659 Published online by Cambridge University Press