

large scatter in the I_0 data may be partially attributed to a similar rotation effect, but may possibly indicate genuine variations in its scattering properties.

Session 14: Coconino Room, 1500-1730

14.01.04 On a Stability Criterion in Convective Media, Y. SOBOUTI, Pahlavi University Shiraz, Iran - The condition for the stability of a fluid system against perturbations that do not disturb the pressure equilibrium is obtained by minimizing the enthalpy of the system. Vanishing of the first derivative of enthalpy gives the equation of hydrostatic equilibrium. The requirement that the second derivative be positive yields the stability criterion of which Schwarzschild's problem emerges as a special case. To quote some results, stability of partially ionized media is worked out exactly. In the low-temperature limit the criterion for stability is $[2/5\rho][1-\alpha(\chi/kT)^2/5] - d(P/\rho)/dP > 0$, where α is the degree of ionization and χ is the ionization potential. The Schwarzschild term, $(2/5\rho)$, is the cooling rate of a perfect gas in an adiabatic expansion. In the high-temperature limit one has $[2/5\rho][1-x\chi/kT] - d(P/\rho)/dP > 0$, where x is the fraction of neutral particles. In both limits, ionization slows down the adiabatic cooling and contributes to the instability of the configuration. From the point of view taken here, the generalized thermodynamic forces, rather than the mechanical buoyancy force, alone, are the appropriate physical quantities which determine the stability of a configuration. This conceptual flexibility enables one to account for a variety of effects, such as the various transport phenomena, in a straightforward and unambiguous way.

14.02.04 Multiple Solutions and Secular Stability of a $7 M_{\odot}$ Star with Core Helium and Shell Hydrogen Burning, D. LAUTERBORN & R. SIQUIG, Joint Institute for Laboratory Astrophysics. - A linear series of static stellar models, with a helium burning core and a hydrogen burning shell source, was constructed for $M = 7 M_{\odot}$. Three branches of solutions were found over a certain range of core masses. Two of these solutions are secularly stable, while the third solution is unstable. This is shown by both an "evolutionary" stability test and by direct computation of the eigenvalues of the secular problem.

14.03.04 "Island" Solutions in Linear Series of Static Stellar Models with Core Helium and Shell Hydrogen Burning for $M = 5, 7, \text{ and } 9 M_{\odot}$, D. LAUTERBORN & R. SIQUIG, Joint Institute for Laboratory Astrophysics. - Linear series of static stellar models with core helium and shell hydrogen burning are constructed for $M = 5, 7, \text{ and } 9 M_{\odot}$. Multiple solutions occur over a certain range of parameters. In some cases, parts of the linear series can become separated and form a disconnected branch of "island" solutions. This occurs at core masses slightly larger than those corresponding to evolved stellar models in the Cepheid phase; our models thus approximate Cepheids having undergone mass loss.

14.04.04 Do Helium-Shell Flashes Cause Extensive Mixing in Low Mass Stars? A. V. SWEIGART, Yale Univ. Obs. - The possibility that a helium-shell flash with a peak burning rate of $1.2 \times 10^7 L_{\odot}$ might induce extensive mixing between the deep interior and the envelope in a $0.7 M_{\odot}$ Population II star has been investigated. The basic procedure has been to artificially insert hydrogen at various rates into the convective zone produced by the helium-shell flash and then to determine whether the resulting energy release might drive the flash convective zone deep into the hydrogen shell. Explicit model calculations have shown that a rate of hydrogen mixing equal to the maximum rate found by Schwarzschild and Härm (1967 *Astrophys. J.* **150**, 961) will not extend the flash convective zone, since essentially all of the energy released by the hydrogen burning is absorbed by a small increase in the expansion rate of the inter-shell region. A rate of hydrogen mixing roughly an order of magnitude greater may cause a splitting of the flash convective zone into two convective regions separated by a small radiative zone. No deep penetration of the envelope convection occurs in the present models. Extensive mixing would therefore seem unlikely during the evolutionary phase considered here.

14.05.04 The Effect of Overshoot Mixing in Old Galactic Clusters, M. J. PRATHER and P. DEMARQUE, Yale U. Obs. - A crude form of overshoot mixing of convective cores in intermediate mass stars ($0.90 - 1.40 M_{\odot}$) is investigated in order to explain the anomalous gap structure of M67. The amount of overshooting is assumed to be proportional to the pressure scale height at the convective core boundary and the entire region is completely mixed. Evolutionary tracks are computed for