and | [N/metals] | is 0.25 for population I stars. The large enhancements of the CN bands which have been observed in globular clusters imply much larger enhancements of nitrogen abundance than are observed for population I stars. It is not possible to produce these CN band strengths by mixing of CN-cycle material from a hydrogen-burning shell, conversion of oxygen into nitrogen or mixing of carbon from a helium-burning region is required.

21.07.03 Mixing by convective overshoot in Population II red giants. P.DEMARQUE and W.-Y. LAW, Yale. Univ. - The extent of convective overshoot below the surface convection zone of red giants has been calculated with the help of a simple mixing length formalism similar to that previously used in the study of lithium depletion in the sun (Weymann and Sears 1965, Ap.J.,142, 174). The calculations were carried out on models of red giant stars in the shell hydrogen burning phase and following the peak of the helium flash(Demarque and Mengel 1971, Ap.J.,164, 317 and 469). This method does not yield information on the efficiency of overshooting, but it provides an estimate, on energetic grounds, of the maximum extent of the overshoot. We found that: 1) overshoot into the layers where the reactions $^{12}C(p,\gamma)^{13}N(\beta^{+}\nu)^{13}C(p,\gamma)^{14}N$ takes place may become important for $\log L/L_{\odot} \gtrsim +2.8$ ($M_{bol} \simeq -2.3$). The strong-CN and the weak-G band stars (Osborn 1973, Ap.J.,186, 725; Zinn 1973, Ap.J., 182,183) could be the result of this kind of mixing. 2) At the tip of the giant branch, overshoot into the helium core may be possible. If this mixing takes place during the core helium flash (a rare event since the flash lasts less than a thousand years), it could be responsible for the existence of the CH-stars. 3) There is in addition an evolutionary phase, following the cooling of the helium core and before the star settles down on the horizontal branch during which overshoot is favored because of the decrease in the steep pressure gradient previously present in the vicinity of the hydrogen burning shell in the red giant.

21.08.03 An Expansion of Normal Modes of Self-Gravitating Fluids. Y. Sobouti and J.N. Silverman, Pahlavi Univ., Shiraz, Iran. In an adiabatic fluid, an analytical separation of the convective and acoustic (or respectively, the g- and p-) modes is possible. The convective modes are those displacements of the adiabatic fluid which leave the pressure equilibrium undisturbed, and the acoustic modes are displacements orthogonal to the former (Sobouti, Astron.Astrophys., 1977). Using this framework and an elaborate perturbational-variational technique, it has been possible to expand the eigenfrequencies and the eigendisplacements of non-adiabatic fluids about those of an adiabatic structure, taking a measure of non-adiabaticity as the perturbation parameter. Here we report the following preliminary results: In the zeroth-perturbation order, the acoustic frequencies and displacements (the latter representing the patterns of motion) are computed; in the first order, the rate of growth of convective frequencies with non-adiabaticity, the convective displacements, and the coupling of acoustic to convective modes are determined; and in the second order, the coupling of convective frequencies and displacements to the acoustic modes are computed. Full details of the procedure for arbitrarily high-order calculations are developed. The perturbational-variational procedure employed above was derived to deal with a generalized perturbed eigenvalue equation; the choice of non-adiabaticity as the perturbation parameter is merely a special application of the general theory.

TUESDAY, 14 JUNE

Session 22: Room 500, General Classroom Building

1400-1600

22.01.06 Gravitation at NASA. R. C. HENRY National Aeronautics and Space Administration, Washington, D. C. 20546 Should NASA support research into the nature of gravitation? What approaches are available for exploring gravitation? Of these, which should NASA employ? What is the best strategy to follow in carrying out a plan? These are the type of questions that will be addressed in formulating NASA's plan for sponsoring research in general relativity. A systematic cost-constrained plan will be adopted this fall. Input from the astronomical community is welcomed.

22.02.06 Gravitational Radiation and Limit on Mass Transfer Rate in Low Mass, Close Binary Systems. W.Y. CHAU, Queen's Univ., Kingston - The possible effects of orbital angular momentum loss via gravitational radiation on the evolution of low mass, close binary systems are briefly discussed. A criterion is derived to indicate when such effects cannot be ignored. It is pointed out that inclusion of these effects makes it possible to set a lower limit to the mass transfer rate in some systems.