NEW THEORETICAL ISOCHRONES

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ABSTRACT Using evolutionary tracks computed by Alongi et al.(1991) for the two chemical compositions Z=0.020, Y=0.28 and Z=0.008, Y=0.25 we constructed theoretical isochrones from $20 \cdot 10^9$ yr to $3 \cdot 10^6$ yr.

1. The models

The models possess initial mass from 0.6 $M_\odot$ to 100 $M_\odot$, span the hydrogen burning phase, the helium burning phase (Horizontal Branch Phase for low mass stars) and end at the Thermally Pulsing AGB phase or at carbon ignition (in more massive stars). We follow explicitly H, ^{3}He, ^{4}He, ^{12}C, ^{13}C, ^{14}N, ^{15}N, ^{16}O, ^{17}O, ^{18}O, ^{20}Ne, ^{22}Ne, ^{25}Mg, ^{26}Mg, adopting updated reaction rates (Caughlan and Fowler 1988). Opacities are from the Los Alamos Opacity Library, implemented with the contribution by molecules. For each chemical composition, two sets of models have been computed, following the alternative treatments of the convective mixing, namely either the classical scheme with semiconvection during central helium burning phase or that accounting for mild overshoot during central hydrogen and helium burning phases.

2. The Isochrones

The isochrones are constructed with the procedure outlined by Bertelli et al. (1990), they account for mass-loss and include all phases up to either the stage of the planetary nebula formation, or the carbon ignition in a highly electron-degenerate core, or the quiet carbon ignition, depending upon the initial mass of the star. Conversions from luminosity and effective temperature to magnitude and colour are based on tables by Buser and Kurucz (1989). The tables provide the actual mass, luminosity, effective temperature, bolometric, U, B, V, R, I magnitudes and colours. Moreover they give the luminosity functions together with integrated magnitudes and colours along the isochrones, computed assuming a Salpeter IMF. A careful comparison with the observed Colour-Magnitude diagrams of some old open galactic clusters show that models which account for convective overshoot ought to be preferred.

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