Stars and Stellar Evolution (WS11-12)
Computer Practicum with WTTS

Exercise 4 (09/12/11)

NOTE: Please save your plots (using the PNG plotting option, "Save As") in your BaMa account, answer the exercises using them and **send your answers to sutirtha@astro.uni-bonn.de** . Mention your folder name (e.g.SSE_WTTS#) in the subject (discuss and work with your group mate(s)).

IMPORTANT: work in the existing folder you were working in for the last exercise(s)

6. Using the **Internals tab**, answer the followinng questions :

1. Plot log(density) vs mass.
   a) There appears to be a point of inflexion near $m = 0.2\,M_{\odot}$. What is happening there?
   b) Plot $\nabla_{rad} - \nabla_{ad}$ (with appropriate limits) to determine where the convective regions are. How do these vary with time?
   c) The plateau on the temperature indicates an isothermal core. Why does that arise? How much luminosity is generated in this core? By what?
2. Where and when are neutrino losses important? (look at ϵ_{ν})
3. Look at the C, N and O abundances. What is happening near the end? Verify your answers by comparing with previous results.

7. Change the abcissa from M to $opacity$ (you might want to use log axes)

1. What is the relation between $\nabla_{rad} - \nabla_{ad}$ and $opacity$?
2. Is this due to changes in ∇_{rad} or ∇_{ad}? Why do these changes occur?
3. At what temperature is the opacity the greatest? Where is this in the star (find the M & R coordinates) ?