

School of Mathematics and Statistics.

MT 4510 - Solar Theory - Sheet 10.

CEP Sem 2, 2005/06.

1. Jan 2000 Q3

(a) N/A

(b) Solve the equations of continuity and momentum for a steady, spherically symmetric, isothermal solar wind to show that its speed (v) at a distance r from the solar centre is determined by

$$\frac{v^2}{c_{si}^2} - \log\left(\frac{v^2}{c_{si}^2}\right) = 4 \log\left(\frac{r}{r_c}\right) + 4\frac{r_c}{r} + C$$

where c_{si} , r_c and C are constants. [5]

(c) Sketch the solutions of this equation and deduce the behaviour of v and the plasma pressure at large distances for both the 'solar wind' and 'solar breeze' solutions. Why was the solar wind solution thought to be more relevant? Suggest extra effects that could be included to make the model more realistic. [8]