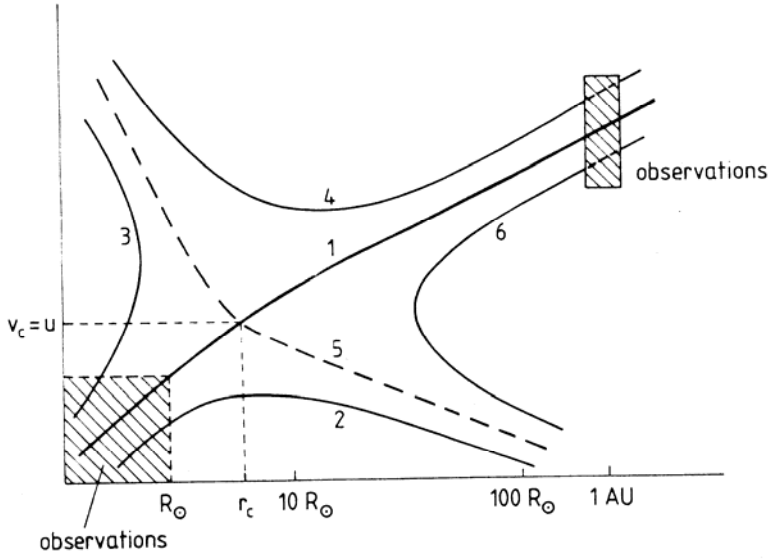
FYS 3610

EXERCISES WEEK 42

EXERCISE 1
The solar wind equation for an expansion spherically and symmetrically gives the following relationship between *v* and *r* (see also lecture notes):

$$\left(2-\frac{GM_S}{c_s^2}\frac{1}{r}\right)\frac{dr}{r}=\left(\frac{v^2}{c_s^2}-1\right)\frac{dv}{v}$$

6 different solution of this equation is illustrated in the figure below. In the lecture we explained solution 1. Discuss the other 5 solutions.



EXERCISE 2
The NASA satellite ACE is used for monitoring the solar wind. It is located around 230 Re upstream. Visit the following homepage http://sec.noaa.gov/ace/ and get yourself familiar with it. Concentrate on the Real Time Data and Dynamics plots, and plot data from MAG and SWEPAM (6 hours time scale I find very useful). List up the different parameters that are plotted in the MAG and SWEPAM plots. What is the typical range for each parameter? Estimate a typical time delay from plasma is being probed by the satellite until the same plasma impinge on the magnetopause.

EXERCISE 3
Exercise 14.5 from Kivelson&Russel

EXERCISE 4
Investigate the home page for SuperDARN radars: http://superdarn.jhuapl.edu. In particular look at Real-Time data, Covection maps. Notice that the solar wind Theta angle in the XZ plane is given in the upper right. It would be good if you could take a frequent look at convection maps under varying solar wind conditions to hopefully reveal a systematic pattern. Then you get an experimental approach to ionospheric convection before we lecture it.