



6. The ionospheric F-region does not have as simple a chemistry/physics scheme as that for the E-layer. However, the annual averaged noon  $\overline{f_oF_2}$  rule of thumb, empirical relationship is:

$$\overline{f_oF_2} = C(1 + 0.02\mathfrak{R})^{1/2}$$

where  $\overline{f_oF_2}$  is the critical plasma frequency at the F-layer peak, C is a constant that is location dependent, and  $\mathfrak{R}$  is the Sun spot number. Calculate the solar maximum plasma density  $N_mF_2$  given that at solar minimum  $\overline{f_oF_2}$  is 4.4 MHz.

7. A horizontal neutral wind in the upper thermosphere can drive plasma either upwards or downwards because the electrons and ions are bound to magnetic field lines even although the flowing neutral gas is colliding with the plasma. How large is the vertical induced plasma drift if an equatorward, meridional, neutral wind of 50 m/s is present at a mid-latitude location where the local magnetic dip angle is  $45^\circ$ .

8. At the same mid-latitude location an eastward electric field leads to a vertical drift. Calculate this induced drift if the eastward electric field has a magnitude of 15 mV/m.

9. The diagram shows three ionospheric electron density profiles. Determine the total electron content (TEC) for each profile. Calculate the slab thickness for each profile.

