B. Sc(H) part III
paper – 7 Group:- A

Alfven Waves:-

Alfvén waves are transverse magnetic tension waves that travel waves that travel along magnetic field lines and can be excited in any electrically conducting fluid permeated by a magnetic field. Hannes Alfvén (q.v.) deduced their existence from the equations of electromagnetism and hydrodynamics (in Alfvén 1942).

or in another words

An Alfvén wave is a low frequency (compared to the ion gyrofrequency) travelling oscillation of the ions and magnetic field in a plasma. The ion mass density provides the inertia and the magnetic field line tension provides the restoring force.

Nearing the ionosphere the Alfven speed rises to about 1000 km/s. Most charges in plasmas are communicated along magnetic field lines by Alfven waves.

Alven Mach number ($M_A = |U^*|/[1.B^*|/\sqrt{P}]$) along the magnetopause as a function of distance S (in Earth radii) from the sub-solar point. a parallel solar wind velocity and magnetic field

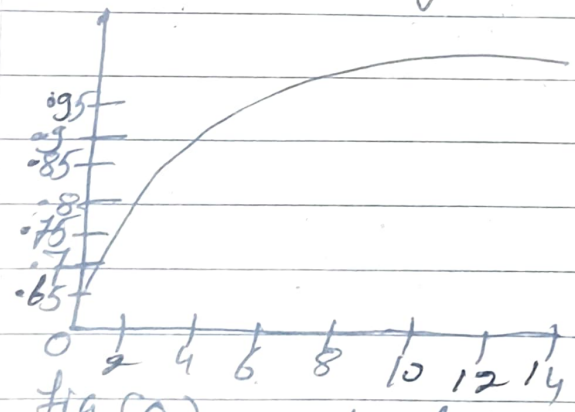


Fig (a)

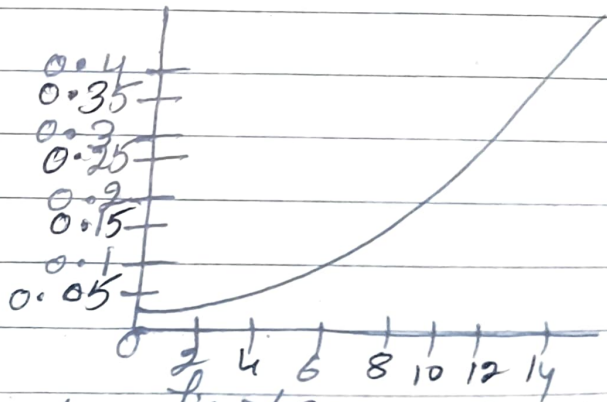


Fig (b)

(a) parallel solar wind velocity and magnetic field: u_{SW} B_{SW}.

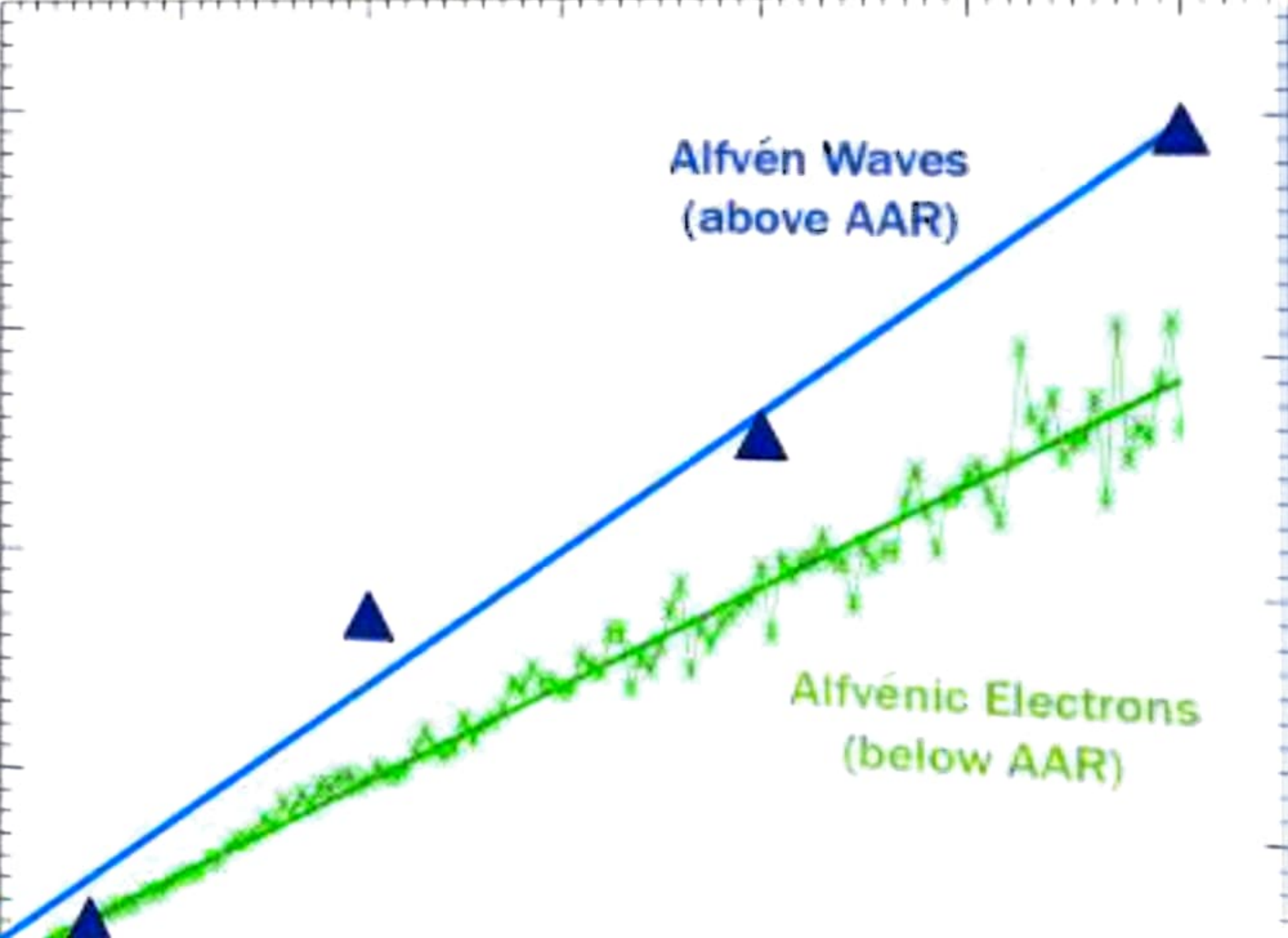
(b) perpendicular solar wind velocity and magnetic field. $u_{SW\perp}$ B_{SW}. The polar cusp is located at S = 10 RE.

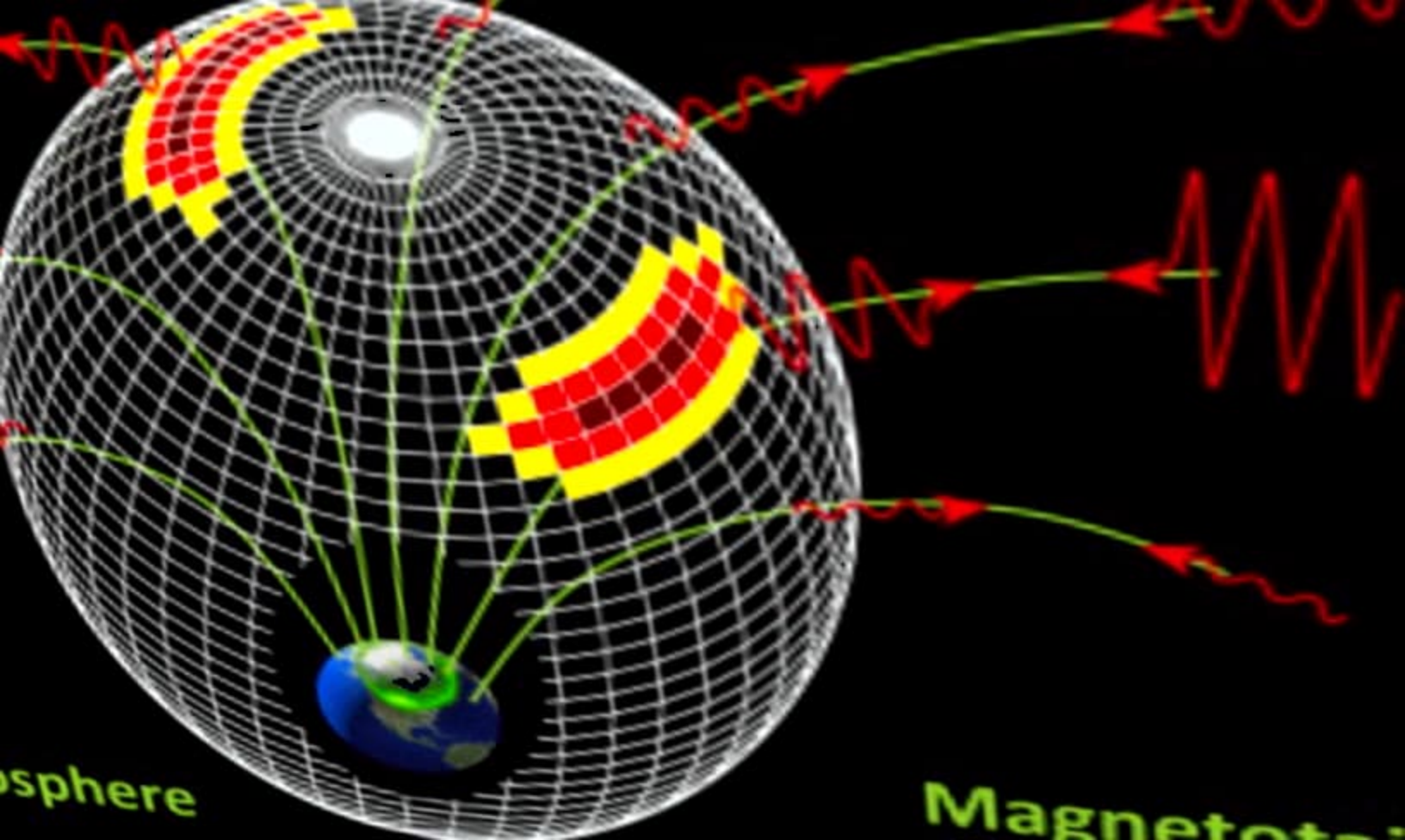
Properties of magetosonic waves and Alfven waves:-

The Alfven waves propagate parallel ~~vel~~ ~~vorticity~~ vorticity and are incompressible. In addition they have no parallel displacement component. The magneto-sonic waves are compressible and in general do have a parallel component of displacement but do not propagate parallel velocity.

fig ① , fig ② , & fig ③ are some Alfvenic oval & evolving auroral oval & Alfven wave etc attached.

—x— The end.


Alfvén Waves
(above AAR)
Alfvénic Electrons
(below AAR)


sphere
Magneto