« Whistler *versus* KAW from Hall MHD »

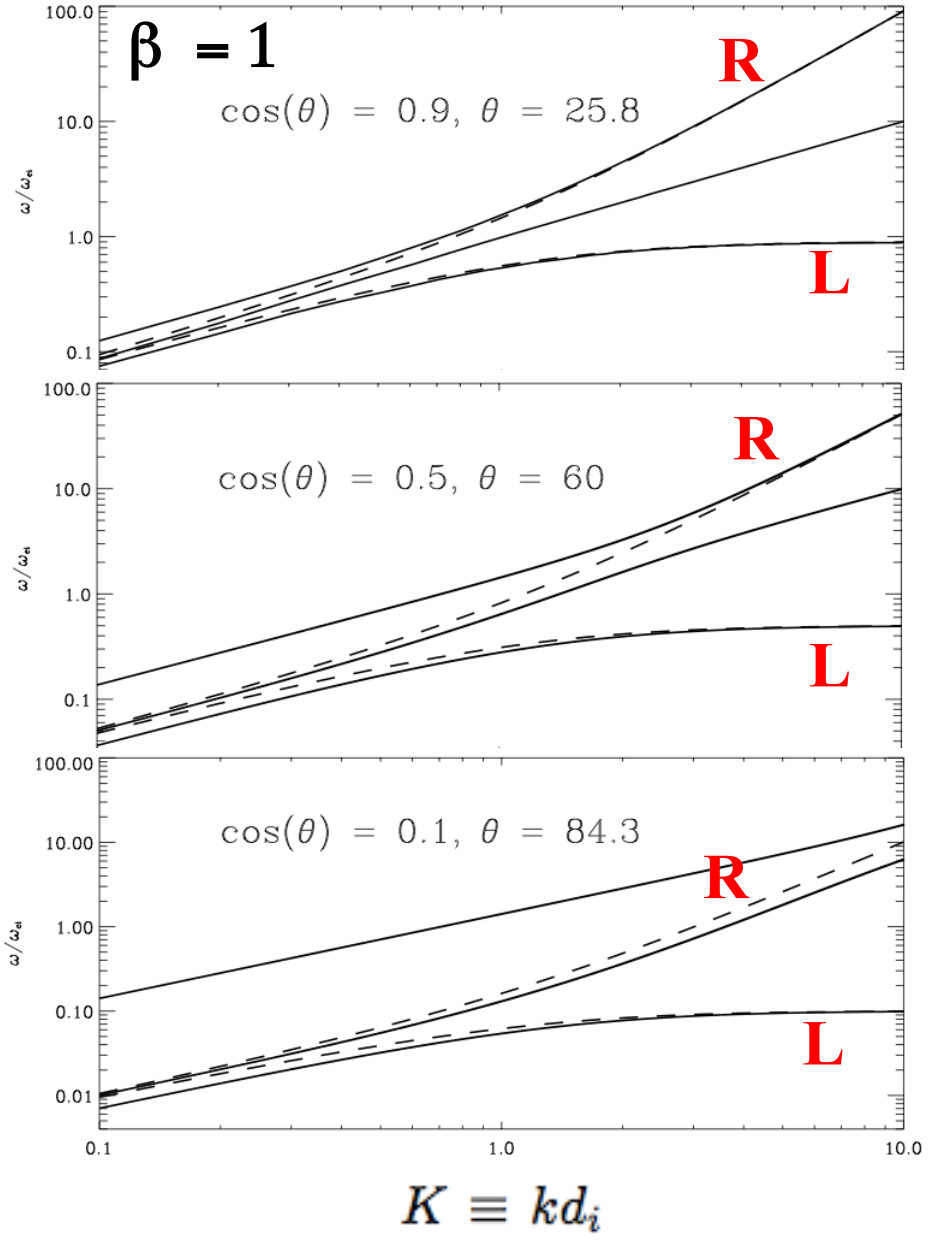
$$\frac{\partial \rho}{\partial t} + \nabla \cdot (\rho \mathbf{u}) = 0\,,$$

$$\rho \left(\frac{\partial \mathbf{u}}{\partial t} + \mathbf{u} \cdot \nabla \mathbf{u} \right) = -\nabla P + \frac{1}{\mu_0} (\nabla \times \mathbf{B}) \times \mathbf{B} + \tilde{\nu} \Delta \mathbf{u} + \frac{\tilde{\nu}}{3} \nabla (\nabla \cdot \mathbf{u})\,,$$

$$\frac{\partial \mathbf{B}}{\partial t} = \nabla \times (\mathbf{u} \times \mathbf{B}) - \nabla \times \left(\frac{(\nabla \times \mathbf{B}) \times \mathbf{B}}{\mu_0 n e} \right) + \eta \Delta \mathbf{B}\,,$$

$$\nabla \cdot \mathbf{B} = 0\,.$$

There are three well-known branches



Compressible branches

Incompressible branches

R Right polarization

L Left polarization

KAW relation :

$$\omega/\omega_{ci} \simeq \sqrt{\beta/(1+\beta)}K^2\alpha$$