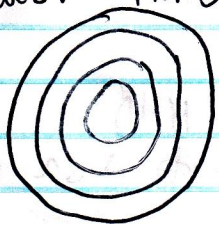
March 9th

Bulk Transport

Chapter 6 to 6.4 (web) Chapter 13 → applications of fluids



$\int j_\perp dA$ = total leakage

$$\rho_j \left[\frac{\partial \vec{v}_j}{\partial t} + (\vec{v}_j \cdot \nabla)\vec{v}_j\right] + \frac{dV_i}{dt} = \rho_j \vec{E} + \rho_j (\vec{v}_j \times \vec{B}) \cdot \nabla p_j \quad (6.25)$$

$\rho_j = m_j n_j$

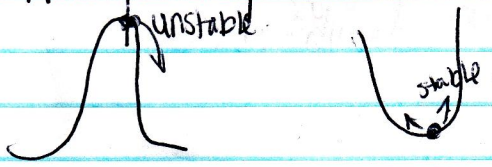
3 Conservation equations
1. Continuity
2. Energy
3. Momentum

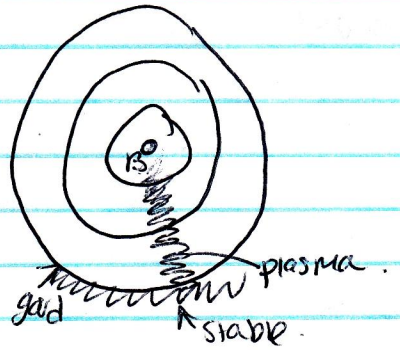
+ Maxwell's equations } MHD description of the plasma (highly used because it is very accurate)

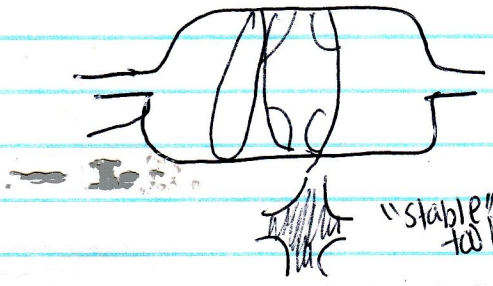
We want high collisions rate.

Chapter 13

MHD Stability







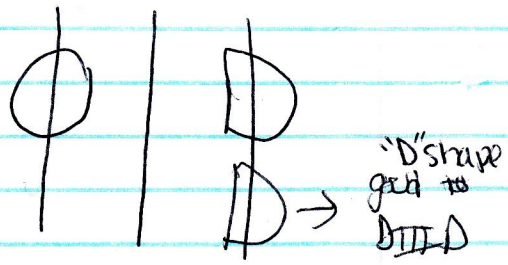
Flick's Law

$j = -D \nabla n(r,t)$

↑ diffusion

$D_{\parallel} \sim \frac{\lambda^2}{\tau} \rightarrow \lambda \sim T^{1/2}$

$D_\perp \sim \frac{r_L^2}{\tau} \sim \frac{1}{B^2 T}$



If it curves into the plasma it is good

If it curves out of the plasma it is bad.