

Lect 1-7 Re-cap

→ Basic Ideas Scales

→ Viscous Flow in Cylindrical Geometry
Viscous Stress

→ Viscous Stress Model of Accretion

- Disk structure
- Velocity + Time Scales
- Density Σ , Angular Momentum Transport (with r). (inner exerts torque on outer)
- $\dot{M}$, r , Σ relations
- Viscous Heating + Luminosity

Basic "Transport Model"

→ Dynamics of Accretion

- Relaxation - fixed mass → solid body rotation
- accretion

↓
minimum energy



accreted state + 1 particle at ∞ (carries ang. mom).

- Rayleigh - 2 particles, interchange conserving angular momentum, each.
- Reddy's buoyancy, Rayleigh Discriminant

→ Lynden-Bell 2 particles → conserve sum of L , mass

$\Delta E < 0$ → accretion + angular-momentum transport outward.

Electrically coupled particles ⇒ MRI.

→ Crash Course in MHD

- Eqs. ⇒ Flow + Induction, $\nabla \cdot \mathbf{v} = 0$
- * - Freezing-in, Alfven Thm.
- stresses, Energetics
- * - Waves - especially Alfven (shear)
- * - Magnetic Braking, Torsional Alfven. 
- Virial Theorem → lumped parameter.
- PI MHD + Ambipolar Diffusion - Neutrals + plasma.
- Energy Principle.