

Notes for presentation to Avi, Cady, and Kayla!

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Overall structure:

- Intro to fluids
 - Write NS equation?
 - * Historical timing (old field but still confusing today)
 - * Viscosity
 - * Material derivative
 - * Linear and nonlinear terms
 - * The reynolds number
- Phenomenological information
 - Neutron star mergers: setup
 - KH instability setup
 - * Linear and nonlinear stages
 - * Draw lines on board
 - Turbulence
 - * Zeroth law
 - * Scaling with Re
 - Results of ideal MHD
 - * Field line freezing
 - Effects on KH
 - * Field line stretching increases field strength
 - Effects on KH
 - * Tension and bending
 - * Derive?
 - * Alfvén waves?
 - Reconnection (and knot theory)
 - * Simple diagram
 - Dynamo
 - * The magnetic Prandtl number
 - * Simple diagram with bending and reconnecting ropes
 - * Sketch of how it occurs in KH
 - Neutron stars
 - * How KH develops
 - * Sketch graphs of magnetic field growth

- * Motivation for my study
 - We need hi-res simulations (past simulations had bad resolution or sketchy methods)
- Second half: quantitative details
 - Linear analysis (kh growth rate)
 - Turbulence cascade
 - * Kolmogorov theory
 - * Zeroth law of turbulence?
 - Spectral methods for simulation