Outline of thesis

1. Introduction
   (a) Introduce the problem and then give basic $\mathbb{R}^n$ examples
   (b) Introduction to FEEC/DG
      i. ~~Covariant Derivatives (translation / isometry prop)~~
      ii. Musical Isomorphisms
      iii. De Rham Complex
   (c) Introduction to GM
      i. Intro to Hamils and Lie Brackets
      ii. Deriving Euler Equations in rigid bodies
      iii. Derive Euler fluid using rigid body
      iv. Body to space map?
2. Eulers Equations
   (a) Derive using Lie derivs
   (b) Euler-Poincaré reduction
   (c) ~~Lie-Poisson Reduction~~
   (d) diffusion
   (e) ~~Compressibility~~
   (f) both
   (g) Theory about stability etc. (maybe not)
   (h) start finding casimirs
3. Casimirs, Helicity and Conservation
   (a) Find more casimirs
   (b) graphs and reeb graphs
   (c) BRACKETS
4. Appendix
   (a) Intro to homology and cohom

Legendre ?

Reference ?

Marsden Lecture Notes?

Legendre transform

$V_t = J_t \circ \eta_t$

advection ?

Talk about it briefly the reduce of Las

25 page tech report

50 "

50 "

or Diff(M)

Ha!

show Arnold bracket doesn't conserve ~~or~~ Enstrophy.

Section on Numerics?

Zachaiov Bracket.

"Never reduce on the Hamiltonian side and never code your own numerical methods" D. D. Holm