EE520, Bollt,

Proj 5, Open Skills Challenge, due F Dec 13

This last project is open ended – the charge is for you to show me something you learned from this semester and apply it to the data set as provided. You are also welcome to use any methods ALSO together with something centrally from this class, whether from some other class or your background, or from one of the many many concepts in this fast growing field of data-driven science and engineering, and also physics informed learning and also machine learning. So that is the general charge. Whatever you do, state what you are doing, state what you are learning about the data, and make a complete appropriate interpretation of the results. Have fun and otherwise, surprise me.

The data set is provided as part of the code attached. It makes data that looks a lot like:
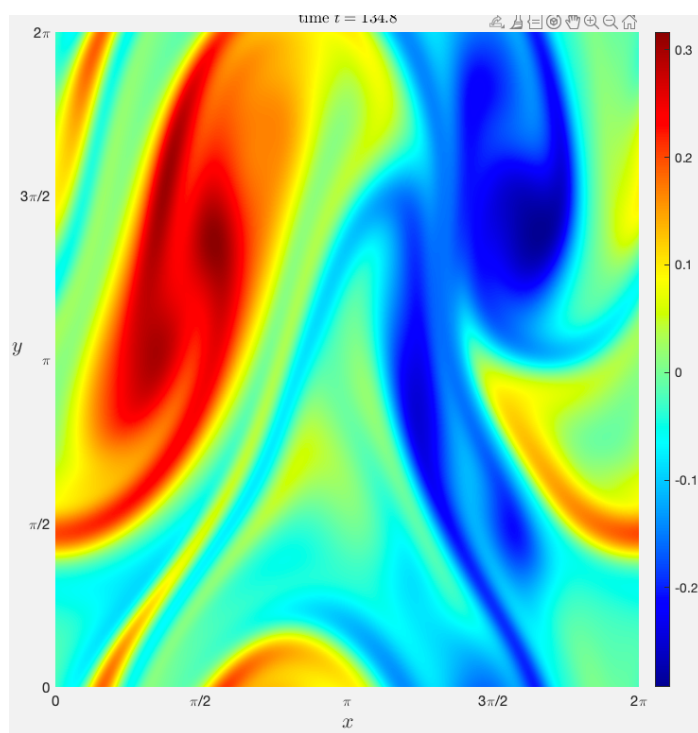
This data comes from an incompressible fluid, in a two dimensional square domain, as modeled by the Navier-Stokes equation stated in the same domain.

$$\frac{\partial \mathbf{u}}{\partial t} = -\nabla \cdot (\mathbf{u} \otimes \mathbf{u}) + \frac{1}{Re} \nabla^2 \mathbf{u} - \frac{1}{\rho} \nabla p + \mathbf{f}$$

$$\nabla \cdot \mathbf{u} = 0,$$

But we will not be worrying in this setting how to efficiently solve these equations – a solver is provided for you. Your job is to rip the solution, which is essentially a spatiotemporal data set, e.g. a movie, and provide some interesting and relevant post processing analysis. Go for it!