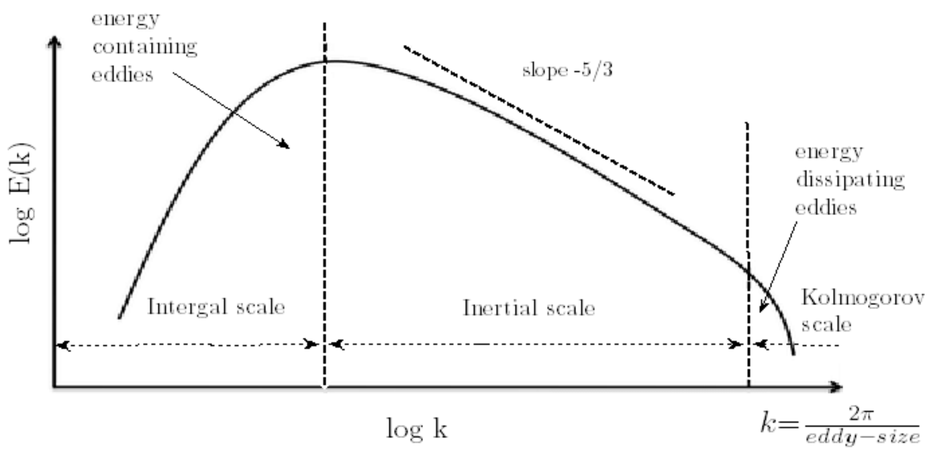
CFD-specific Issues

Physics-related incoherences, instabilities

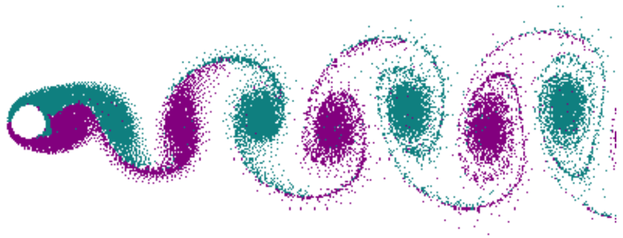


- Check coherence with Energy Spectrums, Divergence, Metrics
- Incorporate Physics loosely w/ PINNs, tightly w/ FNOs
- Improving coherence w/ optimal transport Loss Function (Wasserstein)

https://www.researchgate.net/figure/Sketch-of-Kolmogorov-energy-spectrum-for-all-turbulent-flows_fig1_319321160

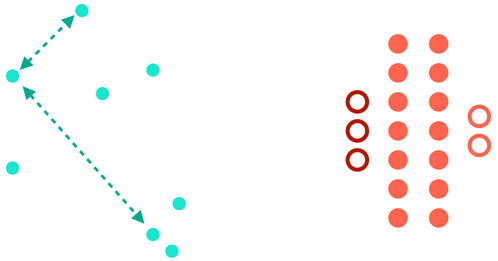
Step-by-step

General Overview



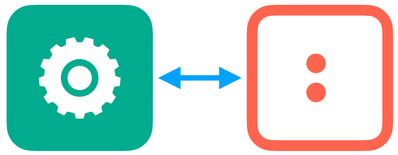
Simulation

1. Formulate the flow problem
2. Build the geometry and flow domain
3. Establish the BC and IC
4. Build the mesh
5. Run the simulation and monitor
6. Perform post-processing



Modeling

1. Select the features and ground truth
2. Clean and reformat the data
3. Build the dataset
4. Build and debug the neural model
5. Train and monitor
6. Check Physics coherence



Coupling

1. Containerize the neural model
2. Build lightweight inference engine
3. Optimize network placement
4. Couple solver + model
5. Monitor & insure numerical stability