E0271- Graphics & Visualization
Project Proposal

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15 November 2021

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Visualization of 3D Flow Around a Confined Square Cylinder using Dynamic Tracking Graphs (Meta Graph Structure)

1 Description

We aim to develop a visualization that demonstrates the spatial time-evolving features in the 3D flow around a confined square cylinder dataset using the concept of meta graph structure

2 Functionalities

We intend to implement the following functionalities,

1. Tracking the topological feature of the data as it evolves with time using meta graph structure – Tracking & Important time step Identification

2. Generation of 3D Visualization for a particular point in the meta graph structure – Spatial Queries

3. Visualizing the behavior of the vortex shedding as the flow changes from steady to unsteady state for different time steps – Overview Visualization

3 References

1. Wathsala Widanagamaachchi, Cameron Christensen, Peer-Timo Bremer, Valerio Pascucci: Interactive exploration of large-scale time-varying data using dynamic tracking graphs. LDAV 2012: 9-17

2. Background: https://www.csc.kth.se/ weinkauf/notes/squarecylinder.html

3. Dataset (102-time steps, velocity): https://www.csc.kth.se/ weinkauf/notes/squarecylinder.html

4. F. Reinders, F. H. Post, H. J. W. Spoelder, “Visualization of time-dependent data using feature tracking and event detection”. The Visual Computer, 17:55-71, 200l.

5. R. Samtaney, D. Silver, N. Zabusky, and J. Cao. Visualizing features and tracking their evolution. Computer, 27(7):20-27, July 1994.