Aerospace Engineering

Course Title: Large Eddy Simulation **Number of Credits: 3**

Course Topics:

- Modeling in CFD
- Overview of Time/Phase Averaging and RANS Models
- Unsteady Simulation of Turbulent Flows (URANS and LES/DNS)
- Scale Separation and Filtering in LES
- Implicit and Explicit Filtering Concept
- Subgrid Scale Modeling
- Constant, Dynamic and Multi Dynamic Coefficient Models
- Modeling of Kinetic Energy Forward/Backward Scattering
- A Priori/ A Posteriori Analysis
- Wall Modeling in LES
- Hybrid RANS-LES and Detached Eddy Simulation (DES)
- Synthesized Inlet Turbulence (Stochastic Reconstruction Techniques)
- Physical Inlet Turbulence (Rescaling and Precursor Method)
- Spectral and Pseudo-Spectral Methods
- Interpretation of LES Results
- Frequency Spectrum Analysis
- An Introduction to Parallel Processing
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Reading Resources:

- Saeedi, M. “A Practice towards Large-Eddy Simulation of Incompressible Turbulent Flows”. Amir Kabir University Press, 2017.
- Saugaut, P. Germano, M. “Large Eddy Simulation for Incompressible Flow”. Springer Verlag, 2002.
- Wilcox, D. C. “Turbulence Modeling for CFD”. DCW, 2007.
- Piomelli, U. “Large-Eddy Simulation of Turbulent Flows”. Queens University, 2012.
- Durbin, P. A. Reif, Petterson B. A. “Statistical Theory and Modeling for Turbulent Flows”. John Wiley and Sons, 2001.
- Pope, S. B. “Turbulent Flows”. Cambridge University Press, 2000.