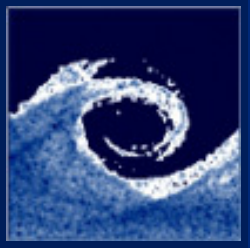
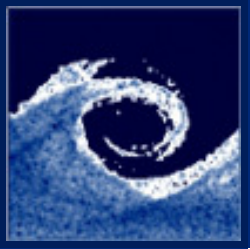


Experiments and Simulations

Lecture 11

Balogh Miklós

April 23, 2014



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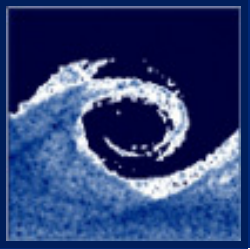
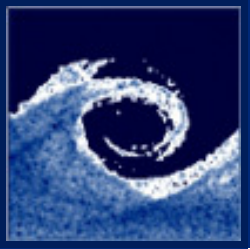


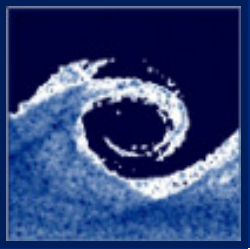
Boundary Conditions

- Inlet BC-s
  - Given analitical profiles
  - Arbitrary input parameters
  - Should be implemented as a new function
  - See e.g.:
    - laminarPipe BC (Lecture 9)
    - Turbulent BC-s for atmospheric flows (in src/.../derivedFvPatchFields)
- Wall BC-s
  - Wall functions for turbulent quantities (ν_t, k, ϵ, ω)
  - Arbitrary input parameters
  - Should be implemented as a new function
  - See WF-s for atmospheric flows (Balogh et al., 2012)
- Special
  - Non-reflective BC-s (wave transmissive, sponge)
  - Sponge should be implemented (via source terms)



Boundary Conditions from Experiments

- Experiments
  - Measured quantities: U, V, W, u', v', w'...
  - Derived quantities: TI
- Simulations
  - Inlet quantities: U, V, W, k, ϵ, ω
- Conversion
  - Turbulent kinetic energy: $k = 1.5\overline{U}^2 I^2$
  - Its dissipation rate: $\epsilon = C_\mu^{0.75} k^{1.5} / l$
  - Specific dissipation rate: $\omega = \epsilon / k$
  - Mixing length estimation: $l = 0.07L$, e.g. $l = 0.07 d_{eqv}$ for fully developed flows in pipes and channels
- Mapping
  - Using timeVaryingMappedFixedValue BC
  - Coordinates: constant/boundaryData/points
  - Quantities: constant/boundaryData/0/...



Topics of re-take exam

- The topics of the mid-term exam (Lecture 1-7)
  - Introduction to OpenFOAM
  - Solving simple fluid flow problems
  - Software components
  - Stationary and transient flows
  - Turbulent and compressible flows
  - Multiphase and reactive flows
- Additional topics
  - Lecture 9 – laminar pipe flow
  - Lecture 10 – advanced post-processing