# Simulating 2D laminar flow in a channel using OpenFOAM

Talk to a Teacher

http://spoken-tutorial.org

National Mission on Education through ICT

http://sakshat.ac.in

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Date: November 22, 2012

# Learning Objectives

- **2D Geometry of Channel**

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- 2D Geometry of Channel
- Meshing the geometry
- Solving and post-processing results in Paraview
- Validation using analytic result

# System Requirement

- **Linux Operating System Ubuntu version 12.04**

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- **OpenFOAM version 2.1.1**
- **ParaView version 3.12.0**
- **OpenFOAM 2.1.1 is supported on Ubuntu 12.04**

# System Requirement

- **The tutorials were recorded using the versions specified in previous slide.**
- **Subsequently the tutorials were edited to latest versions.**
- **To install latest system requirements go to Installation Sheet.**

# Prerequisite

- **Knowledge of how to create geometry using OpenFOAM**

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- **If not, please refer to the relevant tutorials on http://spoken-tutorial.org**

# About flow in channel

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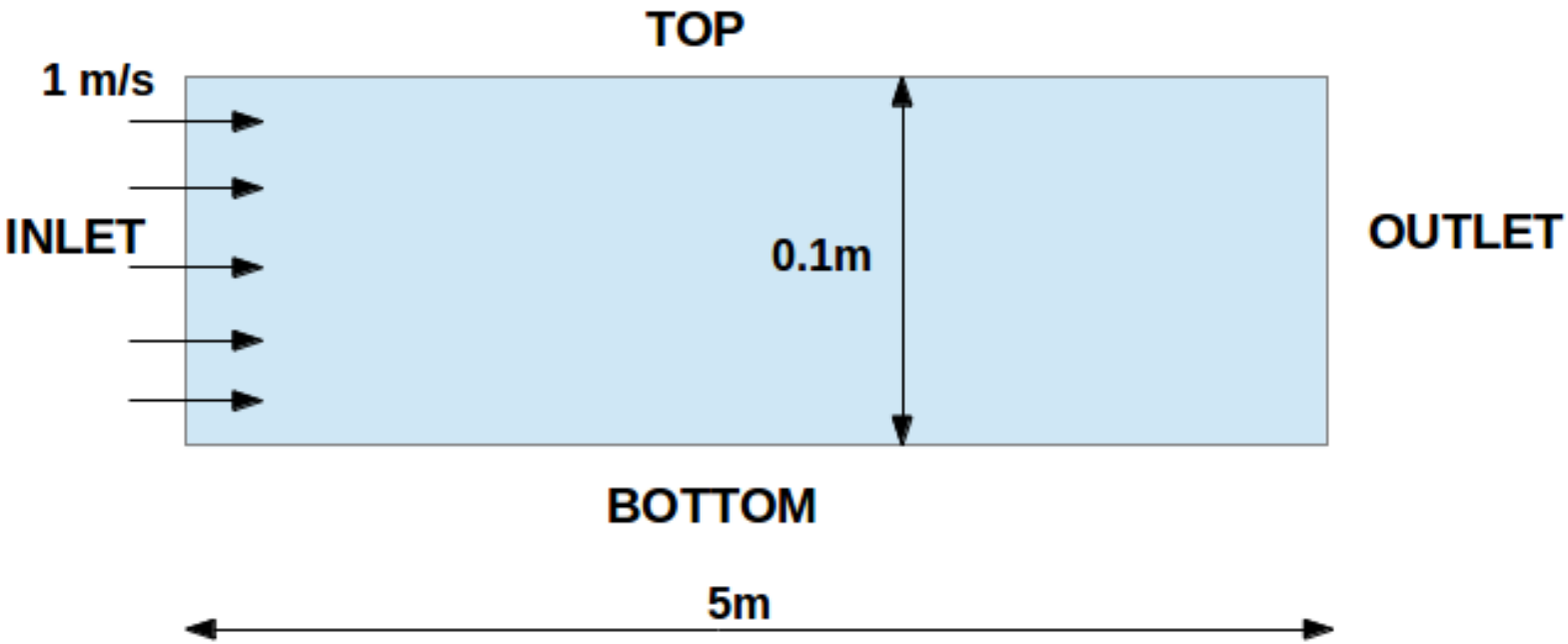
- **We simulate flow in a Channel to determine**
- **Flow development length along the downstream**

# Channel flow



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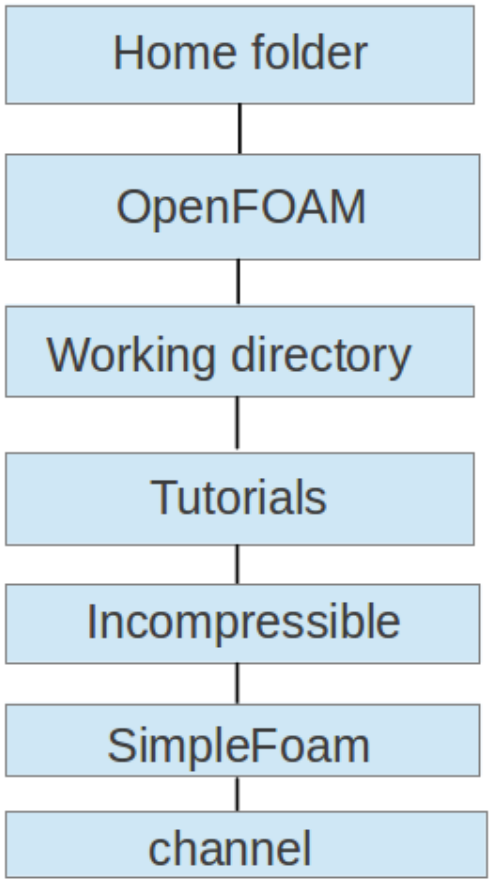
- **Reynolds number(Re)=100**

# File structure

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# Calculate k

$$k = \frac{(U'^2x + U'^2y + U'^2z)}{2}$$

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- $U'=0.05*u_{actual}$

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- $\mathbf{C}_{\mu}$ **is a constant and its value is 0.09**
- **'l' is the length of the pipe**

# Solver

- **SimpleFoam**

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  - **Steady-state solver for incompressible and turbulent flows**

# Analytical result

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- **OpenFOAM result $U_{max}$ = 1.48 m/s**

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- **Solve the problem for Reynolds Number (Re) = 1500**
- **Validate with anlytical results**

# About the Spoken Tutorial Project

- **Watch the video available at http://spoken-tutorial.org /What_is_a_Spoken_Tutorial**
- **It summarises the Spoken Tutorial project**
- **If you do not have good bandwidth, you can download and watch it**

# Spoken Tutorial Workshops

**The Spoken Tutorial Project Team**

- **Conducts workshops using spoken tutorials**
- **Gives certificates to those who pass an online test**
- **For more details,please write to contact@spoken-tutorial.org**

# Forum to answer questions

- **Do you have questions on THIS Spoken Tutorial?**
- **Choose the minute and second where you have the question.**
- **Explain your question briefly.**
- **Someone from the FOSSEE team will answer them. Please visit**

**http://forums.spoken-tutorial.org/**

# Forum to answer questions

- **Questions not related to the Spoken Tutorial?**
- **Do you have general / technical questions on the Software?**
- **Please visit the FOSSEE Forum**
  **http://forums.fossee.in/**
- **Choose the Software and post your question.**

# Lab Migration Project

- **We coordinate migration from commercial CFD software like ANSYS to OpenFOAM**
- **We conduct free Workshops and provide solutions to CFD Problem Statements in OpenFOAM**

**For more details, please visit this site:**

**http://cfd.fossee.in/**

# Case Study Project

- **The FOSSEE team coordinates solving past, current or new CFD projects using OpenFOAM**
- **We give honorarium and certificate to those who do this**

**For more details, please visit this site:**

**http://cfd.fossee.in/**

# Acknowledgements


- Spoken Tutorial Project is a part of the Talk to a Teacher project
- It is supported by the National Mission on Education through ICT, MHRD, Government of India
- More information on this Mission is available at http://spoken-tutorial.org/NMEICT-Intro