ABDUS SALAM
SCHOOL OF MATHEMATICAL SCIENCES(ASSMS)
GC UNIVERSITY LAHORE

OPENFOAM FOR COMPUTATIONAL FLUID DYNAMICS

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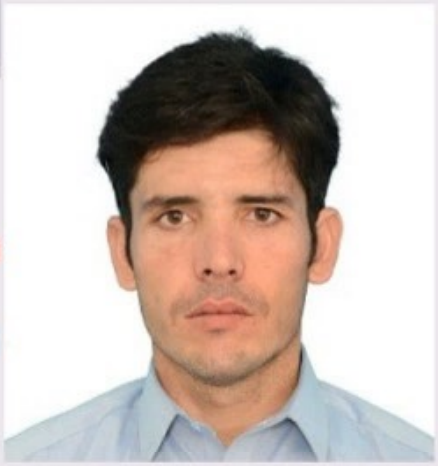

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ABSTRACT

Fundamental methods and mechanisms for mimicking physical processes are provided by computational mathematics and mechanics. Nu-merical computation can provide valuable insights and data that would be difficult or costly to quantify or evaluate experimentally. Furthermore, numerical computing can mimic supernova explosions and galaxy formations, which are impossible to reproduce in earthbound laboratories.

Computational science has been acknowledged for at least thirty years as a third and autonomous field of research on equal footing with experimental and theoretical sciences. Cutting across disciplines at the center of computational science is computational fluid dynamics (CFD), which makes up the core of OpenFOAM and is the focus of this seminar.

The Large Eddy Simulation (LES) model for the simulation of turbulence flow on a spillway having four inlets with a single outlet is carried out. Such flows are observed at hydroelectric power dams. The fluctuating flows produce a large amount of energy in terms of electricity that costs a low amount compared to the energy obtained in tidal power sectors. In the production of hydropower energy, flow simulation is of great interest. The spillway considered in the article contains four inlets and a single outlet. The four inlets will allow more flow, which will exert more pressure near the outlet.

The kinetic energy is computed at the inlets and outlet in the turbulent flow. The fluc-tuated velocity along with the mean velocity at the inlets and outlet are also computed along with the pressure. To better understand the flow behavior, four cameras are placed at different positions for visu-alization purposes. C++ and object-oriented programming are done in OpenFOAM for simulation using the finite volume method (FVM). The animated videos are made in ParaView.

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