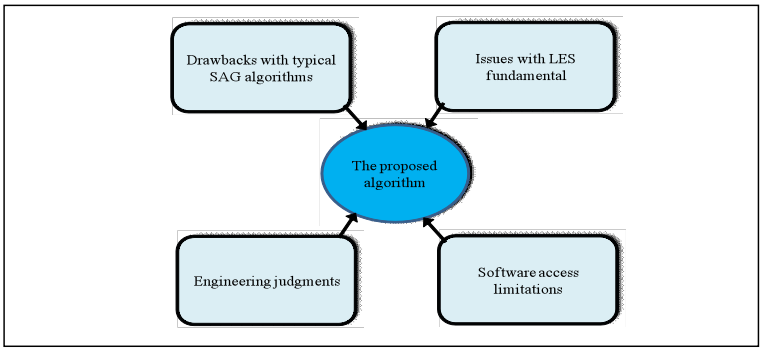
MULTIPHYSICS

A New Solution Adaptive Grid Algorithm for Turbulence Modelling

Objective

❑ To propose a new h-refinement algorithm designed specifically to alleviate the difficulties and uncertainties caused by both undesired aspects of normal existing SAG algorithm and its application with Smagorinsky subgrid scale with large eddy simulation (LES).



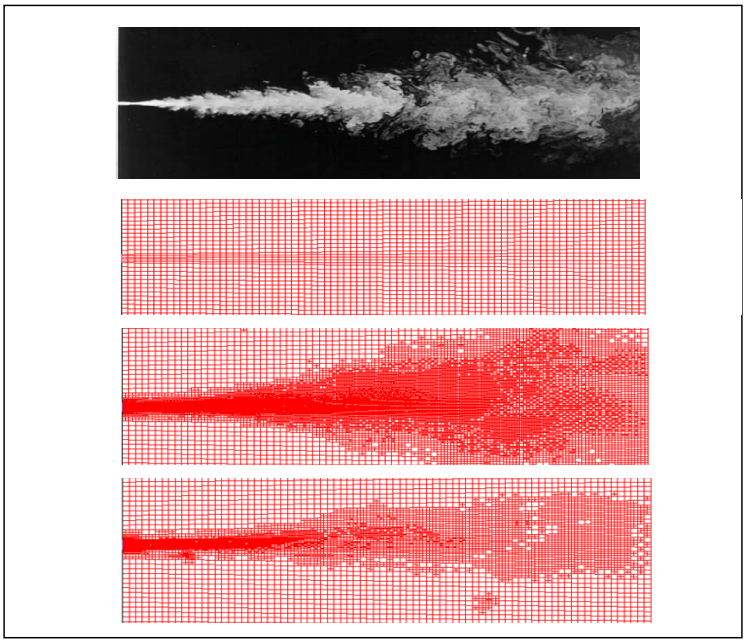
Methodology

❑ The main fundamental enclosure nature of LES is tackled by constructing a bridge linking the subgrid length scale to a real turbulence scale, Taylor scale. The bridge is used as a driving mesh refinement variable and a new simple h-refinement algorithm is formed.

❑ Compromises are made between the limited options provided by the CFD software used, FLUENT, and the ideal and exact structure of the algorithm.

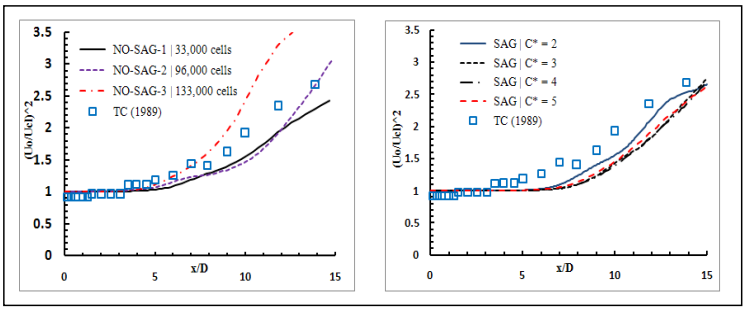
❑ A new parameter, named as refinement constant C*, is added to the formulation of the refinement variable and used as a tool to control the interaction between numerical and modelling errors.

❑ A turbulence plane jet in two dimensions is chosen to be a test case for testing the effectiveness of the proposed algorithm in both aspects; simulation accuracy and computational affordability compared to cases with fixed grid.



Outcome

❑ The enclosure problem of LES is theoretically closed with the new refinement variable. Several drawbacks; users' interfere and judgments, commonly found with typical SAG algorithms are overcome. A remarkable reduction of both number of computational nodes and CPU time is evident with the use of SAG algorithm compared to fixed mesh while reasonably good accuracy is still obtained.



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