TO SIMULATE MOTORING OF A DIESEL IC ENGINE IN A SINGLE SIMULATION

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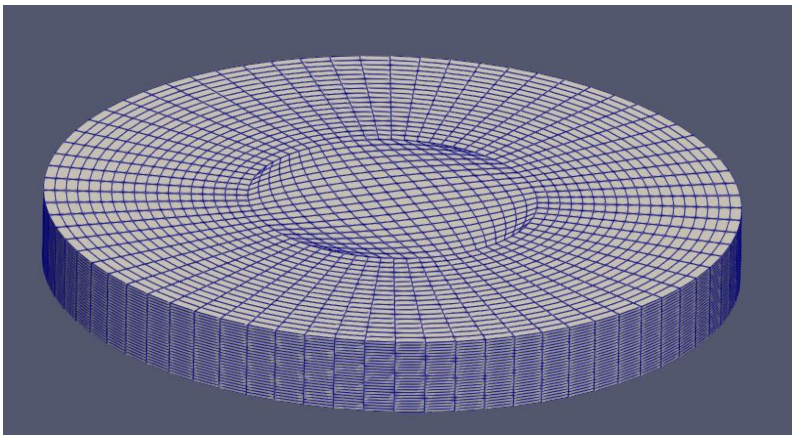
ABSTRACT

This computational case study investigates the thermodynamic behaviour of a motored diesel internal combustion engine through a detailed transient simulation using OpenFOAM. The study focuses on analyzing the engine's performance under both isothermal and adiabatic conditions, employing a laminar Stokes flow model to simplify the Navier-Stokes equations while preserving essential compressibility effects. Numerical modelling is performed using overRhoPimpleDyMFoam solver and stokes laminar model in OpenFOAM. The simulation utilizes the SNL GM 1.9L engine geometry, featuring a structured hexahedral mesh generated with blockMesh and dynamic mesh capabilities to accurately replicate piston-cylinder motion throughout the four-stroke cycle.

The successful implementation of dynamic meshing strategies overcomes numerical challenges associated with piston motion, enabling accurate tracking of fluid domain changes throughout the engine cycle. These findings provide valuable insights into baseline engine behavior without combustion, establishing a robust foundation for future studies incorporating fuel injection and combustion dynamics. Details regarding geometry and flow has been listed in Table-1.



Geometry details	Diameter of bore = 82 mm Stroke length = 90 mm

Table 1