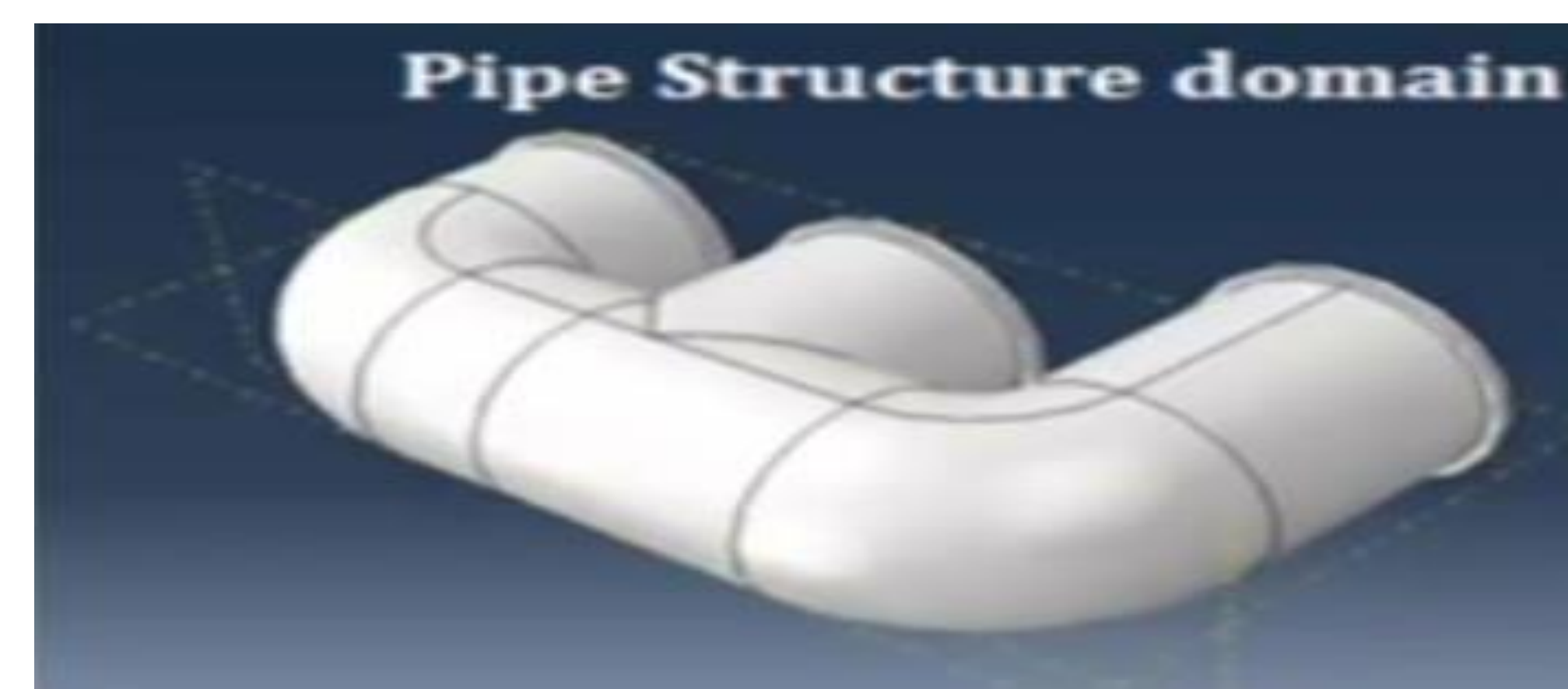
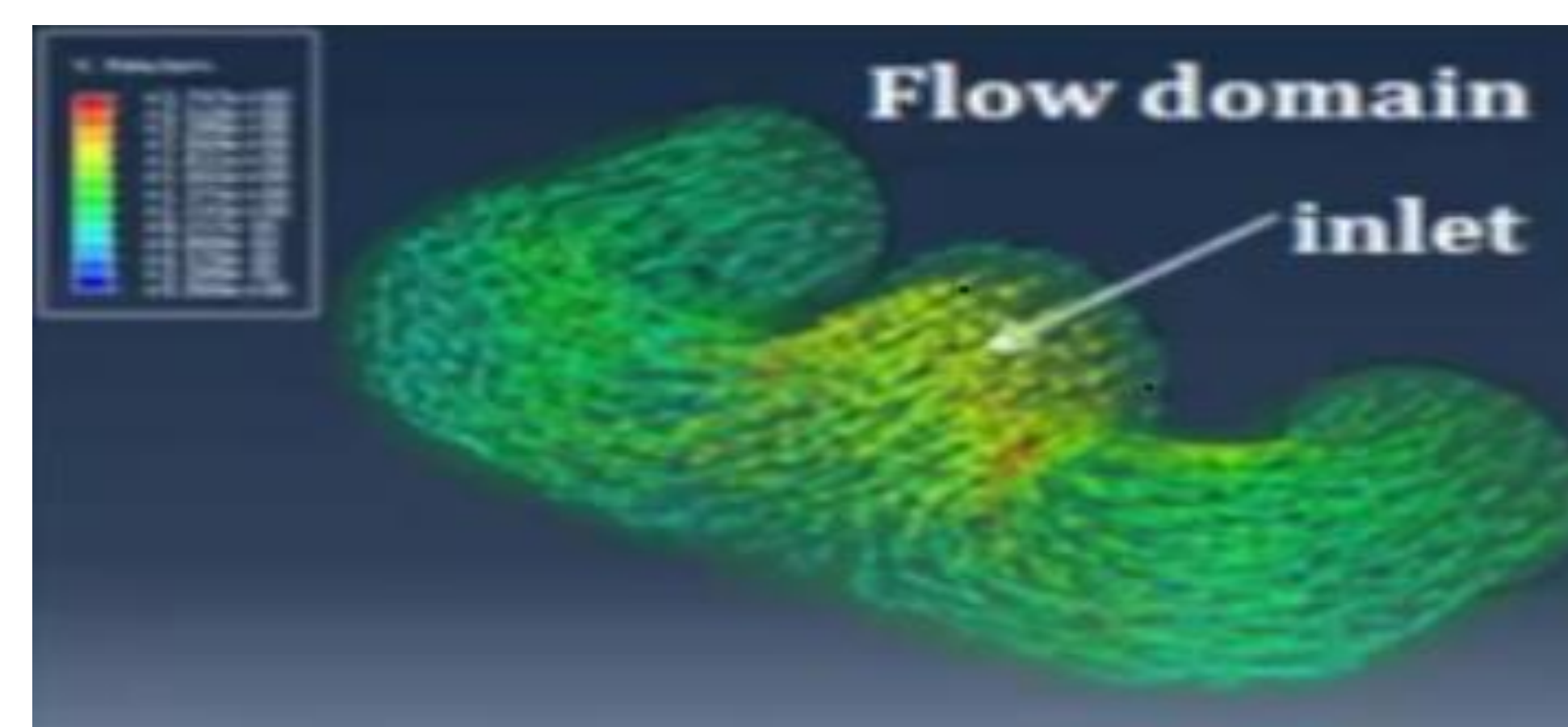


1. Motivation

- The activities involved in oil and gas exploration and delivery are centred around pipes for the flow of oil/gas.
- Different types and sizes of pipes are used, like the drill pipes, risers and the horizontal pipes. The dimensions could be 30" (76cm) or more as they are large capacity pipelines.
- The earliest known [oil wells](#) were drilled in China in 347 AD or earlier. They had depths of up to about 800 feet (240 m) and were drilled using [bits](#) attached to [bamboo](#) poles.
- The history of oil exploration dates to 1891 when the first oil well was drilled at Grand Lake St Mary's, Ohio.
- The Arctic Sea is one of the world's largest remaining areas where oil and gas are accessible.
- The planet's undiscovered natural gas reserves is up to 30%, and the Arctic Sea has 13% of it (USGS).
- Most of the reserves are projected to be in less than 500 metres of water - roughly a third of a mile deep. Up to 160 billion barrels of oil could lay undiscovered beneath the Arctic - compared to 90 billion barrels previously estimated in the region.
- The US estimates the world uses around 30 billion barrels of oil a year.
- The oil and gas sector is very depended upon globally and the US confirmed to use about 60% on it, despite other sources.

2. Objectives

- To develop a model for pipes used in oil/gas industry,
- To develop a model to visualise the flow of oil/gas in pipes in deep sea,
- To optimize the pipeline layouts and pumping systems.



4. Basis of the flow

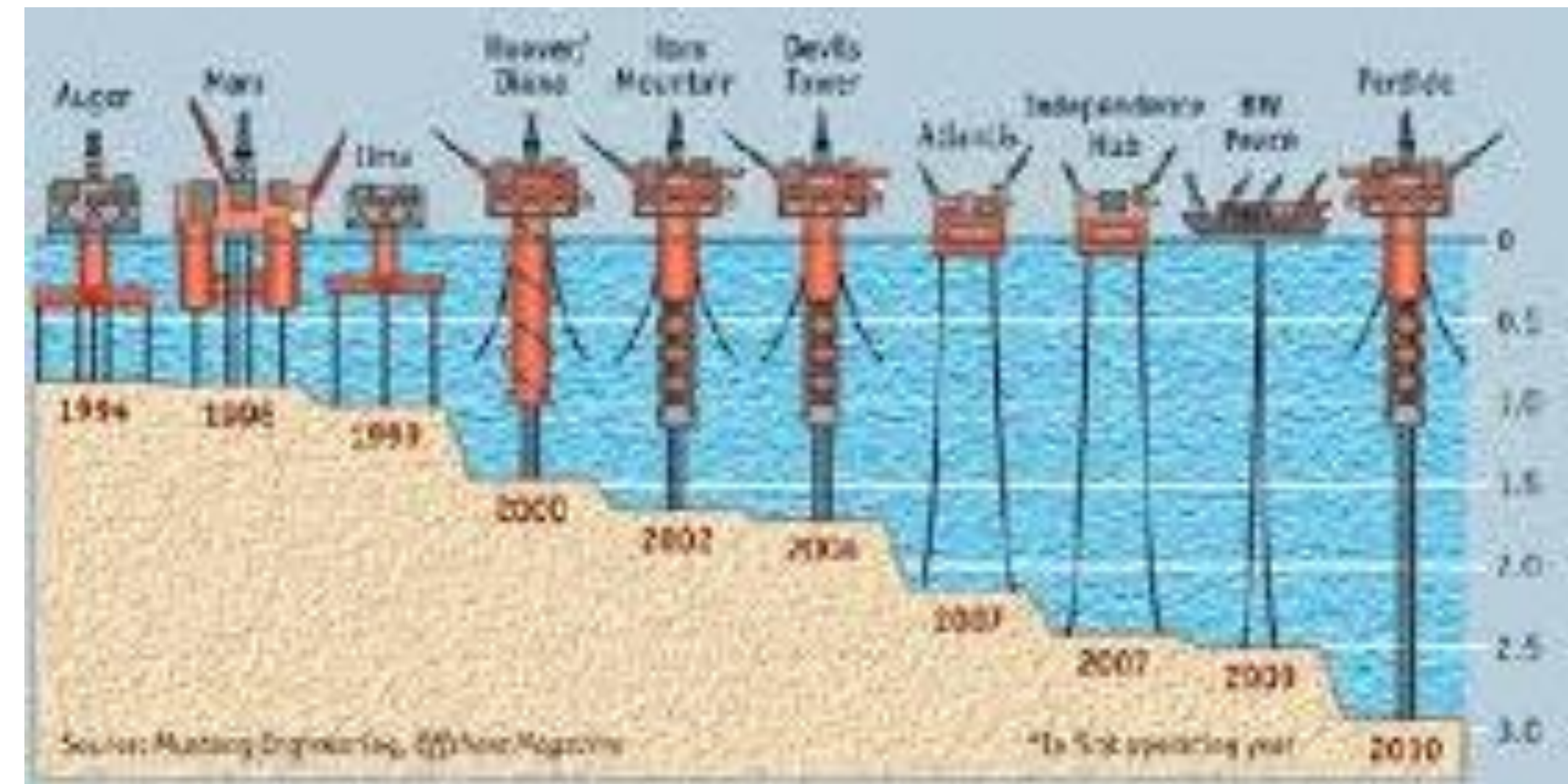
- Continuity Equation
- Conservation of Energy
- Navier Stokes Equation
- The Boundary Condition are then applied using ABAQUS.

$$\frac{\partial \vec{v}}{\partial t} + \vec{v} \cdot \nabla \vec{v} = -\frac{1}{\rho_0} \nabla p + \nu \nabla^2 \vec{v} + \frac{\rho}{\rho_0} \vec{g} - 2(\vec{\Omega} \times \vec{v}) + \frac{1}{c\rho_0} \vec{j} \times \vec{B}$$

The movement of fluid depends upon:

- pressure
- viscosity
- gravity
- rotation
- magnetic term (associated with the Lorentz Force)

3. Oil /Gas Flow in Pipes



5. References

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