

Modeling and Characterization of Novel Deepwater Marine Risers

Amaechi Chiemela Victor¹

2nd Year PhD Student – Engineering Department

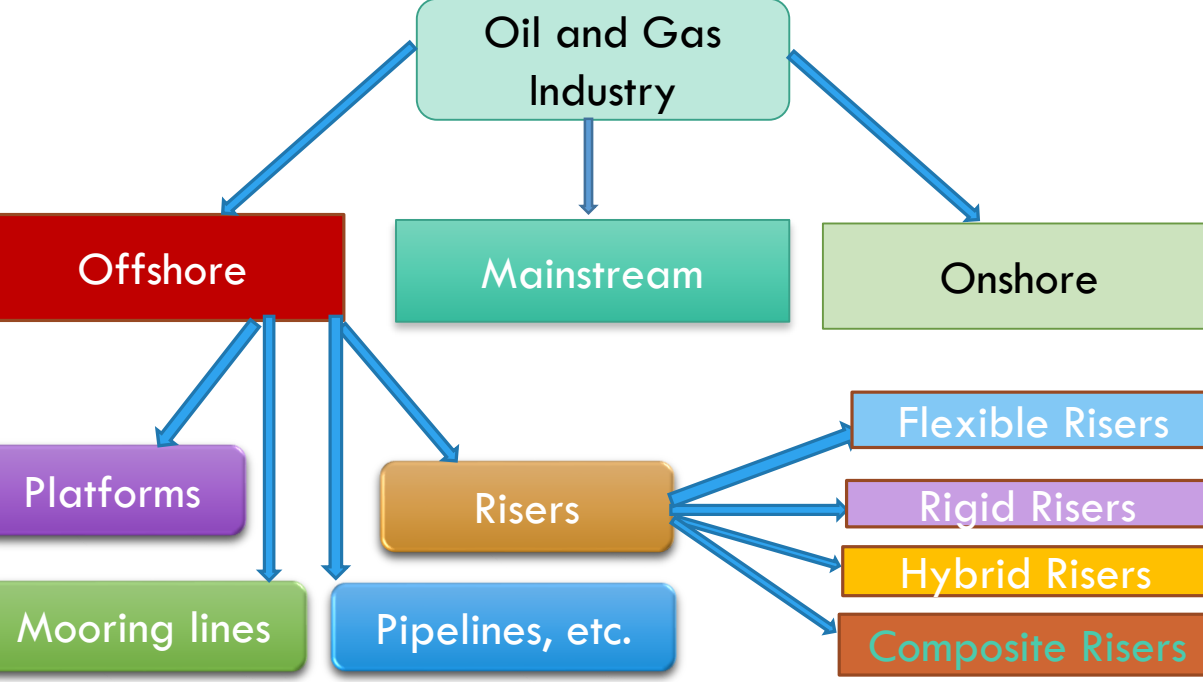
Supervisor: Prof. Jianqiao Ye

¹Email: c.amaechi@Lancaster.ac.uk



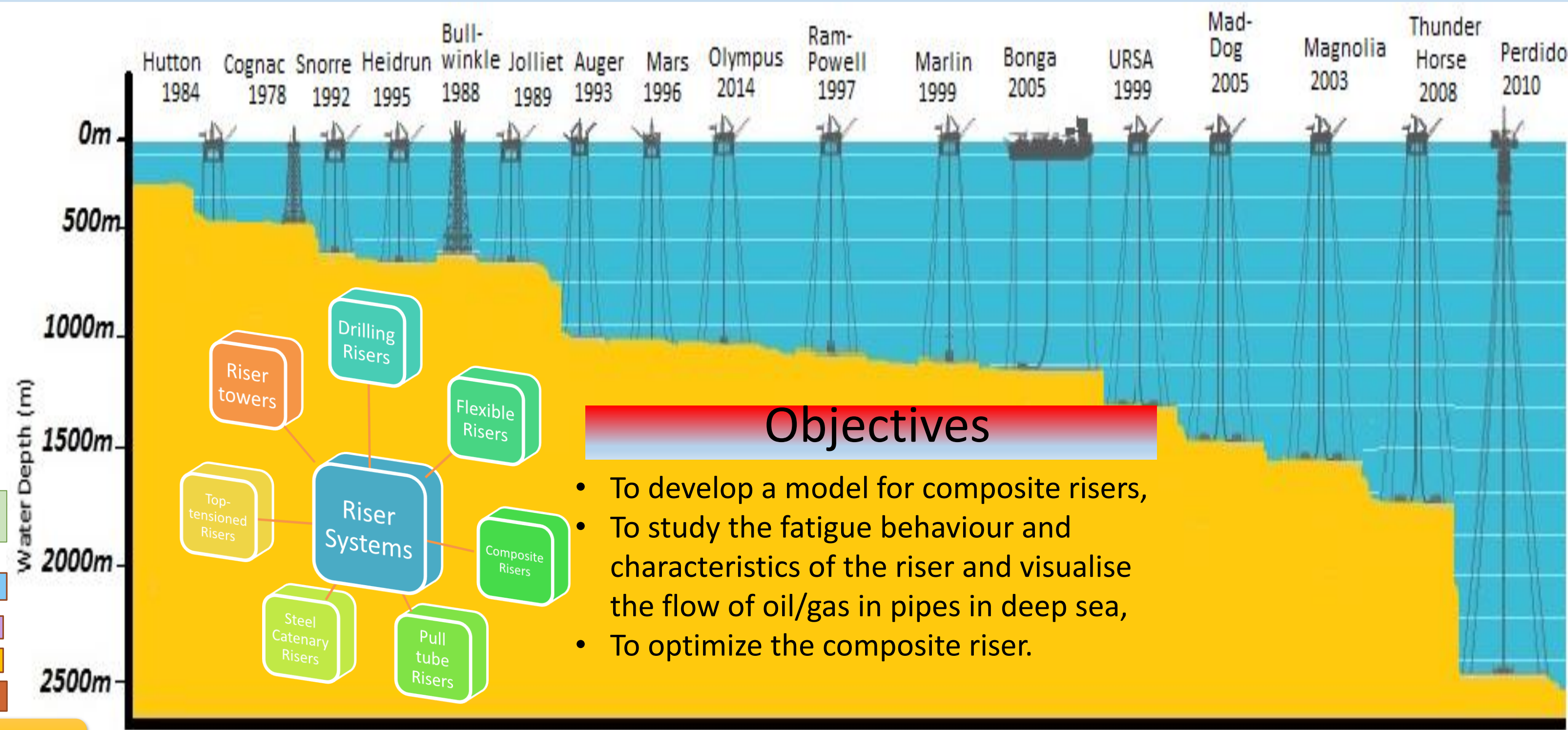
Motivation

- Different types and sizes of pipes are used, like the drill pipes, risers and the horizontal pipes. The dimensions can be about 76cm (30") as they are large capacity pipelines.
- The history of oil exploration dates to 1891 when the first oil well was drilled at Grand Lake St Mary's, Ohio.
- In 2003 in Gulf of Mexico, only 35% of production was from wells at depths of >300m. By 2015, that figure was 95%.



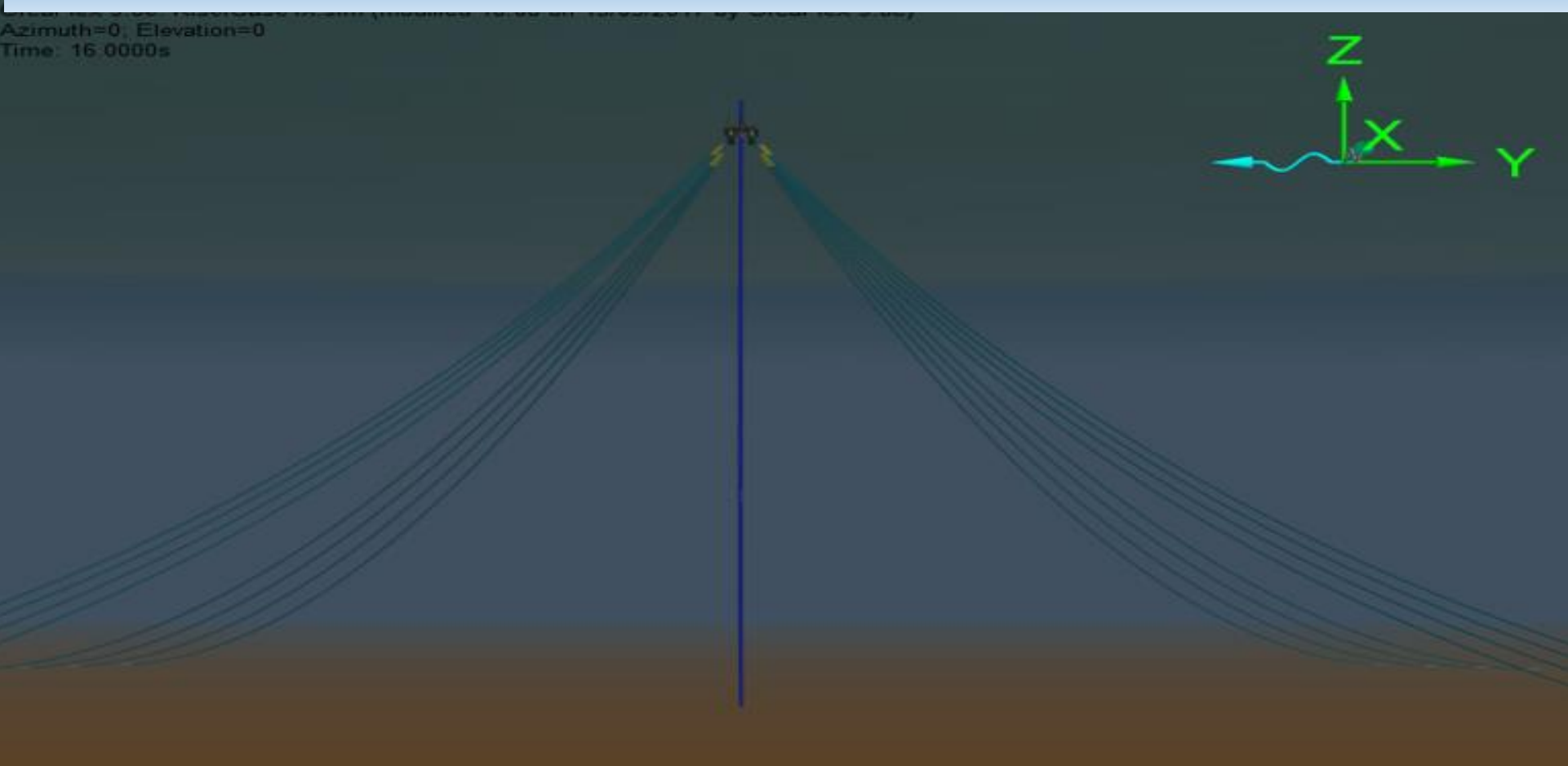
Why Choose Composite Risers?

History on Offshore Deepwaters

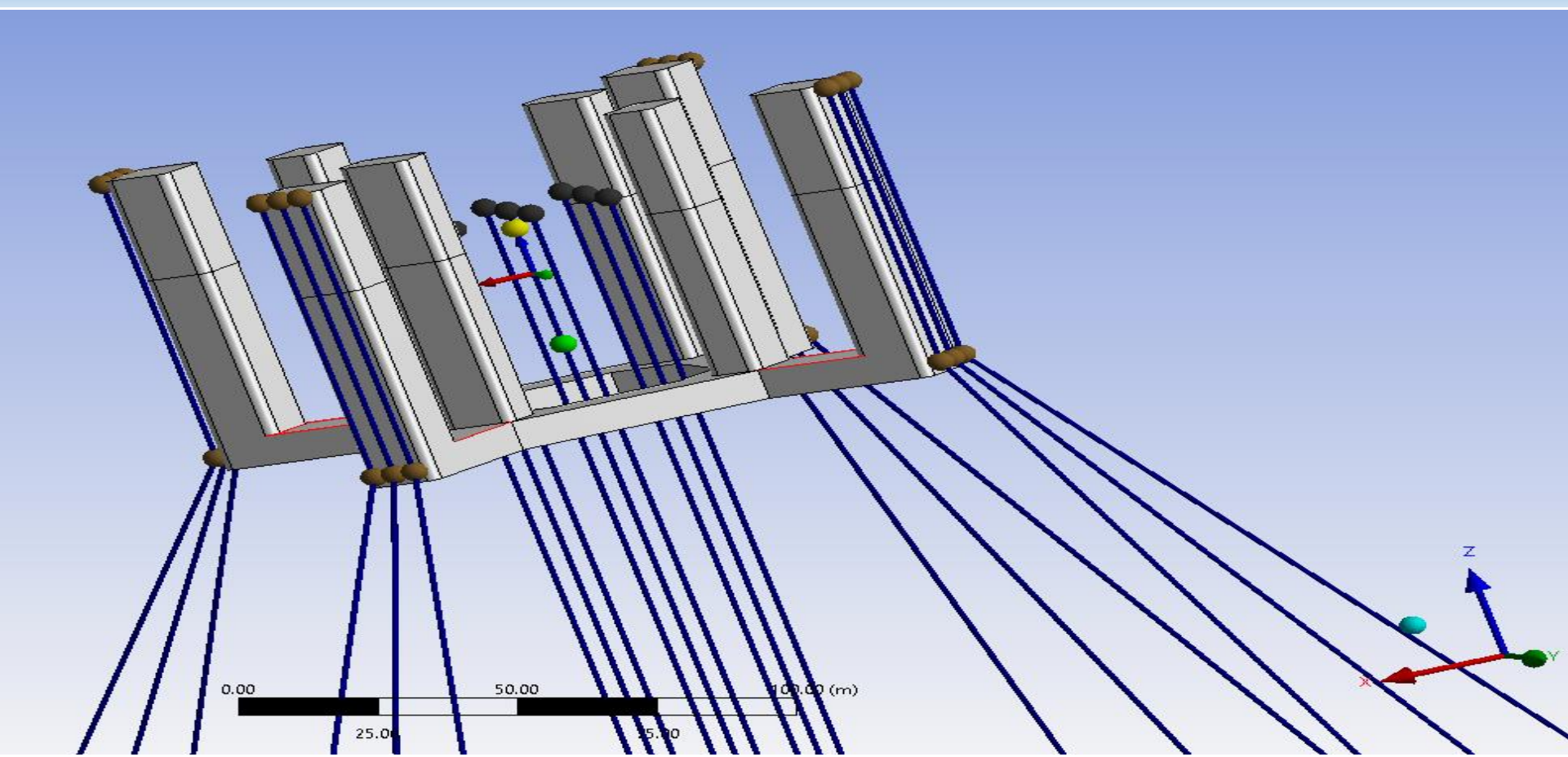


- ### Objectives
- To develop a model for composite risers,
 - To study the fatigue behaviour and characteristics of the riser and visualise the flow of oil/gas in pipes in deep sea,
 - To optimize the composite riser.

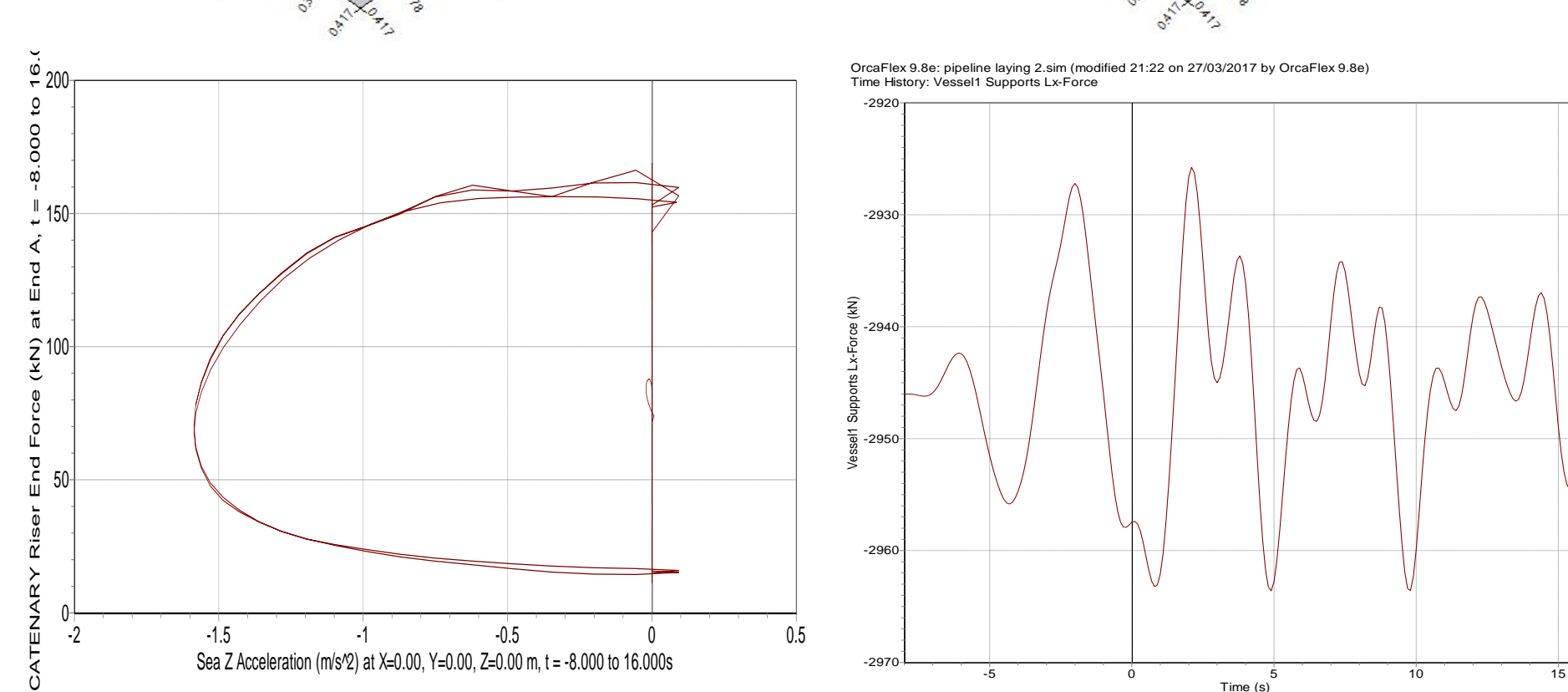
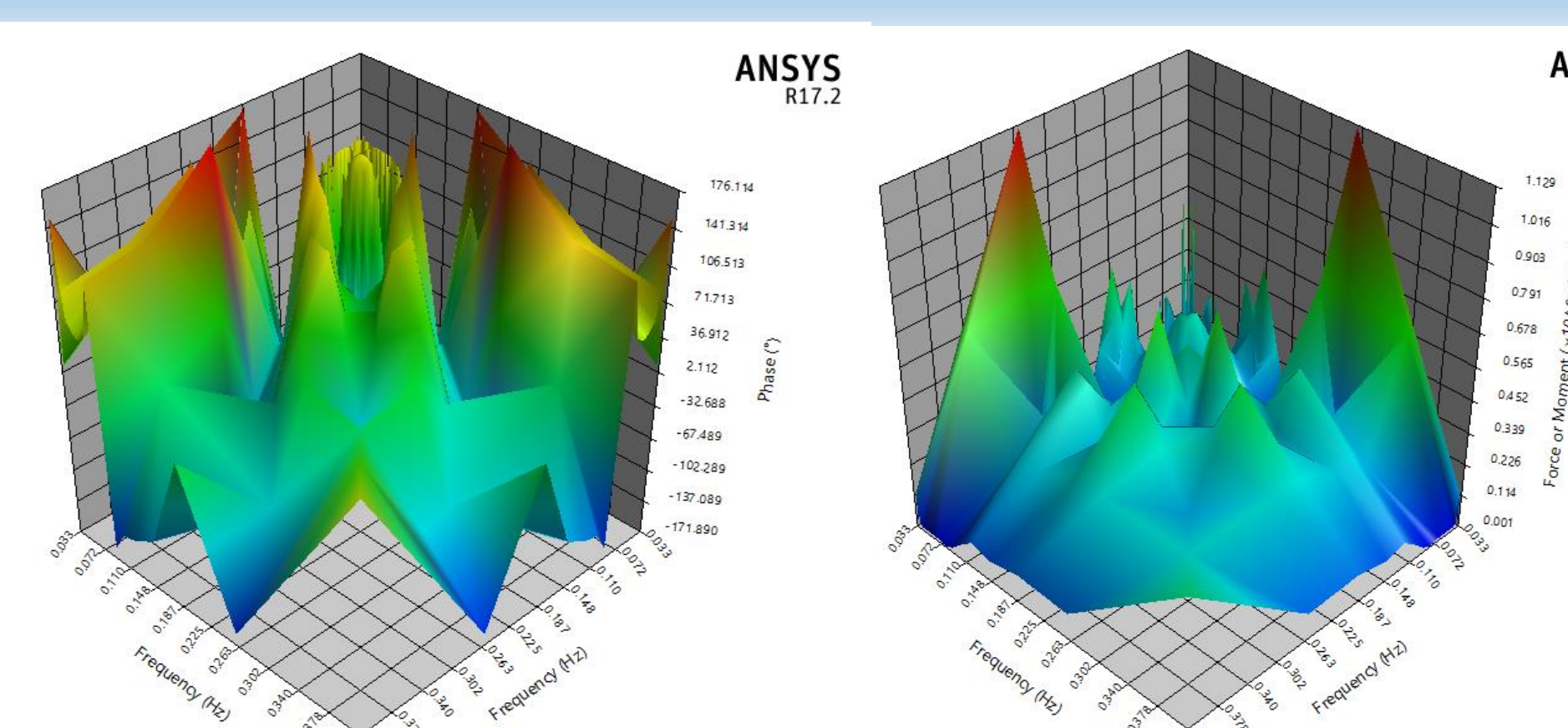
Orcaflex Design



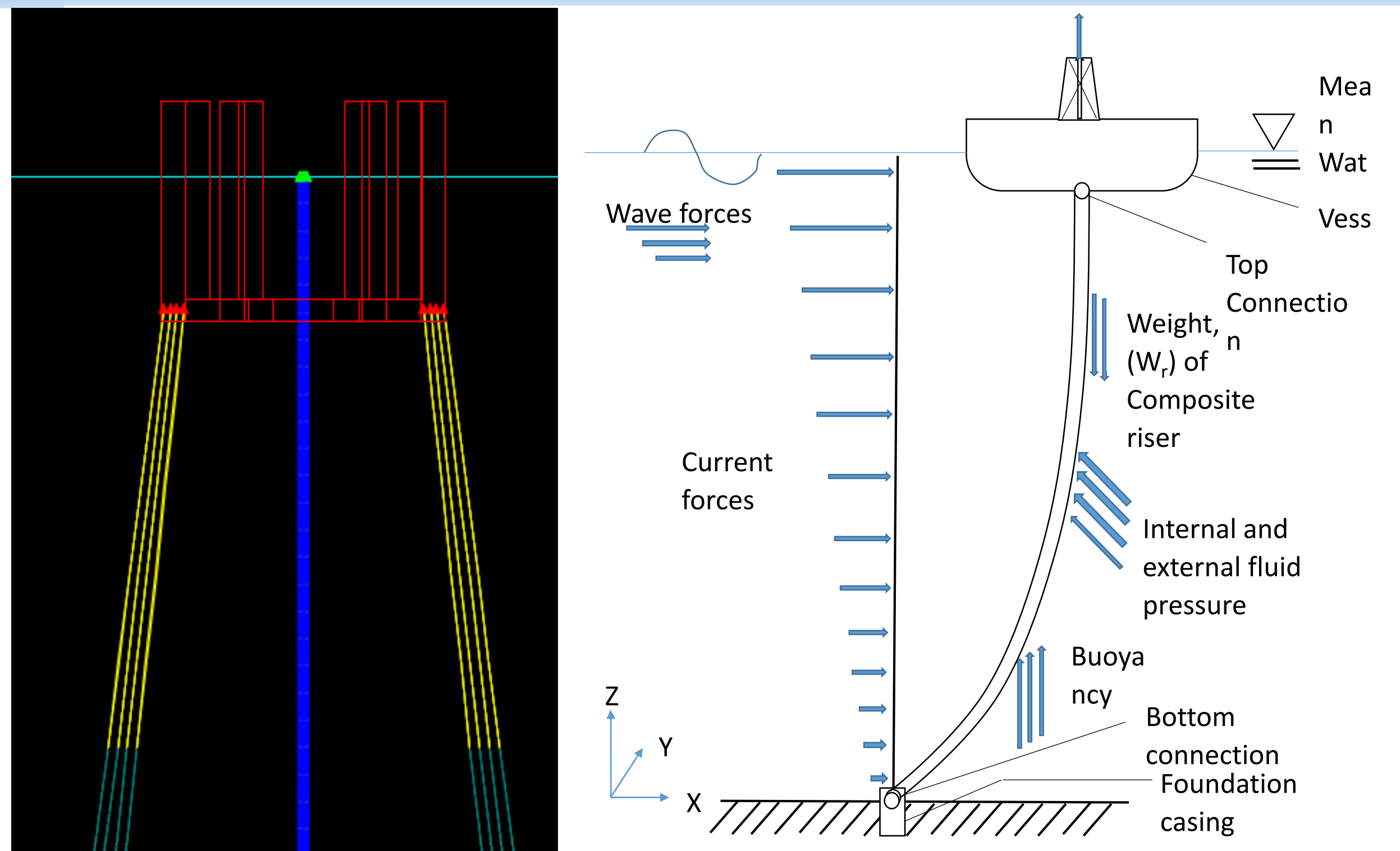
Hydrodynamic Analysis



Presentation of some results



Loads on Marine Risers



Governing Equations

Catenary Equation: $y = H/w[\cosh(\frac{wx}{H}) - 1]$

The Force Matrix: $[M]\{\ddot{x}\} + [C]\{\dot{x}\} + [K] = F(t)$

For Static Analysis:

$$EI \cdot \frac{d^4 y}{dx^4} - T_x \cdot \frac{d^2 y}{dx^2} - W \cdot \frac{dy}{dx} - f(x) = 0$$

Conclusion

The study on Marine riser behaviour is very important. Structures in water behave differently from those structures not in water. Composite materials offer a range of benefits that could improve riser technology. Although composite risers were first deployed in deepwaters in 2002, there are still some challenges, e.g. standards

Acknowledgment

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