EVENING TECHNICAL MEETING

ARTIFISHAL INTELLIGENCE - MACHINE LEARNING FOR SUBSEA

WEDNESDAY 9 OCTOBER | 5.30PM - 8.30PM | PARMELIA HILTON, PERTH

OPTIMISINGSUBSEA TIEBACK ITERATION WITH MACHINE LEARNING

Chris Madeley, SEA Global

In subsea network design, optimizing network layout and sizing is critical for overall development success. Traditional integrated modelling tools often struggle with the trade-off between speed and accuracy during iterative design, leading to suboptimal results. SEA has developed a submodelling framework that flexibly integrates various calculation components. By applying machine learning techniques, SEA automates the creation of surrogate models from detailed flow assurance (FA) modelling results, attaining both excellent accuracy and speed. This innovative approach enables the evaluation of multiple scenarios in parallel, providing robust solutions in a fraction of the duration previously required. This presentation outlines the high-level framework adopted, and how it is a natural extension of SEA's existing approach to automated modelling and structured data management.

AN APPLICATION OF MACHINE LEARNING TO THE MOTION RESPONSE PREDICTION OF FLOATING ASSETS

Dr Michael Morris-Thomas, Worley

Of interest to offshore engineers, oceanographers, and naval architects is the ability the accurately predict and forecast the behaviour of floating assets under the influence of stochastic met ocean conditions. Historically, this has been achieved through a combination of both empirical and frequency domain methods. However, when the behaviour of a floating asset produces non-linear motion responses, these traditional approaches break-down in accuracy. However, with the advent of sophisticated and more mature machine learning algorithms, a different and more efficient approach is afforded.

In this presentation, we will discuss the application of machine learning through multivariate regression to predict the non-linear response of a single point moored, and passively weathervaning, offshore floating facility. In particular, we demonstrate the importance of algorithm selection, dimensional reduction, and pre-computing physically significant parameters before model training commences. Subsequently, we then illustrate the validation of a bespoke machine learning process involving a gradient boosted ensemble method, coupled with a passive weathervaning solver, that was trained over a moderately sized met ocean and mooring response dataset in the order of several million samples. Finally, we demonstrate the model's utility in predicting typical mooring responses of a floating asset and outline how this scheme is applied for both forecasting and monitoring purposes.

USE OF DIGITAL TWIN TO ASSIST IN OPERATIONAL ASSET MANAGEMENT

Chris Saunders, INPEX & Mike Smith, Wood

The ongoing management of offshore operational assets presents many challenges. Ensuring production schedules are maintained whilst risks are appropriately understood and managed requires prudent decision making, informed by actual field / production data and a thorough understanding of the response of the production system. INPEX has been operating the Ichthys field for greater than 5 years, with Wood providing engineering support services where required. This presentation outlines the details of one of the specific challenges facing INPEX whilst operating (associated with lateral buckling) and the way in which Wood has helped manage this challenge via a digital twin of the asset. This digital twin mirrors the critical section of the relevant pipeline and has been used to inform project decisions regarding operating parameters such as increased flow rates and temperatures.

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