## Phenomenological modelling of Vortex-Induced Vibrations of Deep-Water Risers

During the last decade, major changes have taken place in the offshore industry. New oil and gas fields have been discovered in ever increasing water depths (even more than 3000 m) and in more severe environments. To facilitate the transport of oil and gas to the offshore platforms, various kinds of vertical pipelines are used, which are called risers. These risers may vibrate due to the vortices, which occur due to flows around the risers. These vortices induce the riser vibrations, which are called Vortex-Induced Vibrations (VIV). VIV may damage the riser and limit its fatigue life. These vibrations are considered as one of the most crucial threats for deep-water risers.

Existing tools can predict VIV for short risers, based on modal analysis and the mode superposition method. These tools can only predict single-mode vibrations. To study the possible occurrence of multi-mode vibrations without knowing in advance the number of modes that will be excited, Vortex-Induced Vibrations can best be modelled in the time domain.





In this study a 2000 m long beam with linearly varying tension was used to model the riser. To introduce the non-linear dynamic interaction with current a so-called wake oscillator model was employed for the lift force, caused by the vortices. To make this model applicable for long flexible risers subject to non-uniform current profiles, a spatial dependence of the lift force was added to the model.

If you are interested in the results of this study, you are kindly invited to attend the presentation in room 1.96 on Wednesday 14<sup>th</sup> of December at 4.00 pm.

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