



ATLANTIA's Thunder Hawk Deep Draft Semi-submersible.

# MARIN conducts Thunder Hawk VIM testing



Rommelt van der Wal  
R.vdWal@marin.nl

**In the last six to seven years, MARIN has extended its model test experience into Vortex Induced Motions (VIM) on Spars and Deep Draft Semi-submersibles. Recently, the ATLANTIA Thunder Hawk Deep Draft Semi was successfully tested in the MARIN facilities in order to identify the VIM motion behaviour in current.**

The tests were carried out in MARIN's Depressurised Towing Tank, which measures 240 m x 18 m x 8 m. This facility has proven to be especially suited for VIM testing due to its long tow length and large cross-section area. A uniform current flow was simulated by towing the model in otherwise calm water. The optimised test program consisted of tow tests for different headings of the semi. By towing the model at different towing speeds, a large range of current combinations was covered.

## Unique set-up

The combination of a purpose-built air bearing system and vertical mooring system, formed a simple and easy to use set-up. The air bearing system has been successfully used before on similar projects. In fact, dedicated in-house research tests formed the basis for the recently-launched MARIN JIP 'Current Affairs'. In this JIP, the flow around floaters and columns, lift effects and VIM motion behaviour on offshore structures like TLPs and semis, will be investigated. The applied air bearing system restricts the heave, roll and pitch motions of the semi but has an extremely low friction in the horizontal plane. The model was held in place by a vertical spring system with uni-directional stiffness above the water line.

This set-up ensured a set of 'clean' tests, where the total damping and flow patterns originated from the semi-submersible hull alone. In addition, the tow heading of the model could be changed very quickly and efficiently in the basin.

## Tow tests and flow visualisation

Towing test results showed the distinct effect of tow heading and current speed on the VIM response of the semi. In addition to the towing tests, flow visualisation checks were carried out in order to have a better understanding of the complex flow patterns around the square columns and pontoons. **MARIN**



Flow visualisation.