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HYDRAULIC BEHAVIOUR OF THE FLOATING WAVE ENERGY CONVERTER WAVE DRAGON

T. Hald¹, J.P. Kofoed¹ and E. Friis-Madsen²

ABSTRACT

Over the recent years wave energy converters (WECs) have gradually been brought into focus utilizing various concepts of energy conversion from the waves. One special class of WECs is the overtopping type, i.e. it converts the potential energy obtained when waves are overtopping into a reservoir at a higher level than MWL by leading the water back into the sea through a number of turbines. Among such WECs is the Wave Dragon (WD), developed and patented by Friis-Madsen. The WD has been under continuous development since 1995 supported by the European Union (EU) through the JOULE-CRAFT programme and the Danish Wave Energy programme. Present development plan (2001-2002) includes the deployment of a 1:4.5 scale model WD in a large inlet in Denmark where the wave climate resembles the downscaled North Sea wave climate.

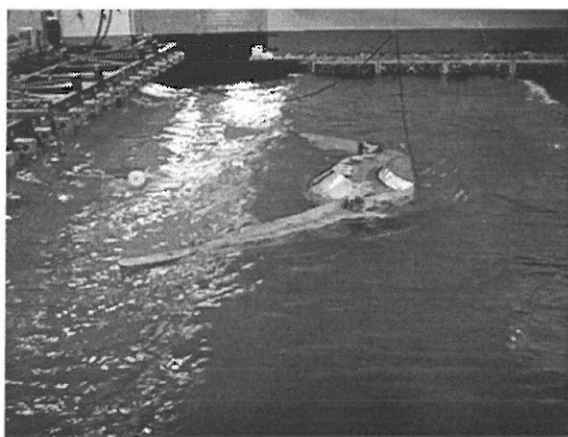


Figure 1: Photo of the Wave Dragon.

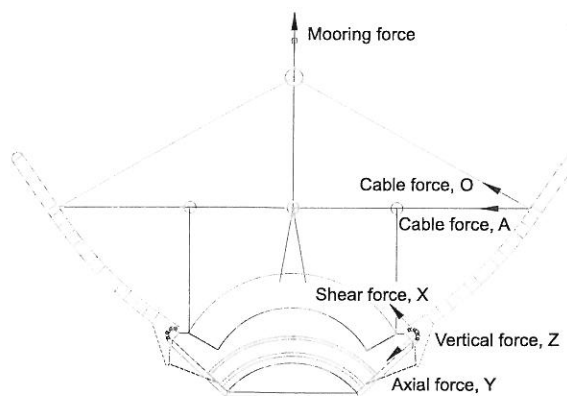


Figure 2: Plan view of the Wave Dragon.

The WD is designed to be floating on open chambers of pressurized air in order to damp the movements as well as allowing adjustments of the free board. Different configurations of the air chambers were tested in order to achieve the best possible energy output as well as hydraulic performance.

In order to investigate the hydraulic behaviour of the WD and the open air chambers a series of model tests in scale 1:50 have been carried out at Aalborg University measuring forces in different structural elements as well as movements in heave, surge and pitch. Results from these model tests will be presented in the paper and the behaviour of the WD in serviceability and ultimate limit states will be discussed.

REFERENCES

Kofoed, J.P., Frigaard, P., Sørensen, H.C. and Friis-Madsen, E.: *Development of the Wave Energy Converter – Wave Dragon*, in Proc. of the 10th International Offshore and Polar Engineering Conference (ISOPE), Seattle, USA, 2000.

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