



COLLOQUIUM

In accordance with article 4.6.8 of the SSNS-wb.

Group: **Engineering Fluid Dynamics**

As part of his MSc thesis assignment

Bart Schuiling

will give a presentation, entitled:

Influence Ship Wake Scale Effect on Prediction of Hull Pressure Fluctuations due to Cavitating Propellers

Date: Friday July 30, 2010

Time: 14:00

Room: HR C101

Summary:

One of the greatest challenges in the design process of a ship and its propulsion system is the accurate prediction of the cavitation that may occur on the propeller. Cavitation, the explosive evaporation of liquid water in low pressure regions and the subsequent implosions during pressure increase, can cause severe erosion on propeller blades and appendages. Cavitation is often also a source of noise and vibration which has a negative effect on the comfort on board a ship.

A cavitating propeller induces hydroacoustic pressure fluctuations through the passing propeller blades, and more importantly, by the dynamics of the cavities. The induced pressure fluctuations are transmitted through the water and excite the ship hull above the propeller, resulting in noise and vibrations.

In the last decade container ships have grown to immense dimensions with corresponding impressive performances. For efficiency reasons, container ships have a single screw propulsion system. Because of the ever increasing required power, the prediction of full-scale cavitation behavior has become more important than ever before.

Unfortunately, with the rise of these giants of the seas, also a problem arose for the model testing of these fast, slender, single-screw vessels: the hull pressure fluctuations predicted from model-scale experimental results were too high. A major cause of the over prediction has been identified as the so-called ship-wake scale effect. This effect refers to the difference between the wake field of the model and that of the ship due to the difference in Reynolds number at basin scale and at full scale.

In the present study experiments and numerical simulations have been employed to gain insight in the problem and to find ways to improve the prediction of pressure fluctuations for large container ships.

Assessment committee:

Prof.dr.ir. H.W.M. Hoeijmakers (chairman)
Ir. H.C.J. van Wijngaarden (mentor)
Dr.ir. A.H. van den Boogaard
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