Faculty Engineering Technology
Program Mechanical Engineering

University of Twente.

COLLOQUIUM

In accordance with article 4.6.8 of the SSNS-wb.

Group: **Engineering Fluid Dynamics**

As part of his MSc thesis assignment

Sebastiaan van Loo

will give a presentation, entitled:

Numerical Study on Collapsing Behavior of a Spherical Cloud of Cavitation Bubbles

Date: Friday March 11, 2011

Time: 14:00

Room: ZH 286

Summary:
One of the major causes of wear of ship hydrofoils is cavitation. Clouds of interacting bubbles behave nonlinearly and can experience very sudden changes in void fraction. These nonlinear mechanisms of collapse can result in a coherent collapse of bubble clouds which has a high damage potential

In this study a model, proposed by Wang & Brennen (1999), has been implemented and applied. This model is able to describe the fully nonlinear behavior of a spherical cloud of bubbles. In the model a cloud of nuclei starts cavitating when it is subjected to a decrease in ambient pressure. It is shown that, when the ambient pressure recovers, a bubble collapse front appears which travels inward or outward through the cloud, depending on the initial void fraction. An inward moving collapse front focuses the local pressure peaks and enhances the noise and damage potential of the cloud.

A sensitivity study has shown that the parameters most influencing the collapsing process of the cloud are the pressure perturbation period and the initial void fraction. Furthermore the linking of the results obtained in the present study with results of Reynolds-averaged Navier-Stokes (RANS) methods is explored. Different types of pressure perturbations are imposed on the cloud of nuclei in order to create a situation comparable to a cloud shed from a sheet cavitiy as computed with a RANS method.

Assessment committee:
Prof.dr.ir. H.W.M. Hoeijmakers (chairman)
Prof.dr.ir. T.J.C. van Terwisga (mentor)
Dr.ir. E.T.A. van der Weide
Dr.ir. R. Hagmeijer
Prof.dr.ir. T.H. van der Meer

Chairman:

d.d.

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