Opleiding Werktuigbouwkunde

Universiteit Twente
de ondernemende universiteit

COLLOQUIUM

Conform artikel 4.6.8 van het SSNS-wb.

Vakgroep: **Technische Stromingsleer**

In het kader van haar doctoraalopdracht zal

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een voordracht houden getiteld:

Inverse design method for centrifugal pump impellers:
new blade loadings and incorporation of blade thickness

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Summary:
Inverse design methods for turbomachinery differ from conventional design methods in that, besides the flow field, the geometry of an impeller blade is determined. Therefore, an extra boundary condition is needed, additional to the physical constraints that apply to both types of design methods. This condition is the prescribed blade loading condition. The starting point is a three-dimensional potential flow method for the inverse design of blades without thickness, developed at the University of Twente. The assignment is divided into two major parts.
The first part addresses defining the blade loading in terms of variables which are more suitable for the designer than the conventional definition in terms of a mean-swirl loading. The new ones are: (1) a derivative of mean-swirl loading (2) a velocity loading and (3) a pressure loading. Then guidelines are to be found of how the distribution of these blade loadings affects the final blade shape. For the new blade loadings it is concluded that when the loading is shifted towards the leading edge, the blade angles are higher so that the blade itself becomes shorter. The opposite occurs if the loading is shifted towards the trailing edge.
The second part deals with incorporating blade thickness in two-dimensional configurations, this in order to investigate the effect of blade thickness on the final impeller geometry. An extended method has been developed, implemented and verified. The inversely designed blades have higher blade angles, resulting in shorter blades compared to blades without thickness. The new method can serve as a starting point for an inverse design method for three-dimensional configurations with a prescribed blade thickness.

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