Opleiding Werktuigbouwkunde

Universiteit Twente
de ondernemende universiteit

COLLOQUIUM

Conform artikel 4.6.8 van het SSNS-wb.

Vakgroep: **Technische Stromingsleer**

In het kader van zijn doctoraalopdracht zal

Sietse Harmen Jongsma

een voordracht houden getiteld:

Implementation and Validation of a Reynolds-Averaged Navier-Stokes Eddy-Viscosity Model in a Finite-Volume Method

Datum: dindag 26 – 08 – 2008

Tijd: 14:00 uur

Zaal: HR N109

Summary:
Most flows encountered in science and engineering are turbulent. However, the direct numerical simulation (DNS) of turbulent flows is highly computational expensive. With the current computational resources the use of DNS is limited to flows at moderate Reynolds numbers. Hence, the effect of turbulence on the flow needs to be modelled, in order to be able to carry out high-Reynolds-number flow simulations. In the Engineering Fluid Dynamics group of University of Twente, a method is currently developed for the numerical simulation of flows around wind turbine blades. These flows encompass high Reynolds number flows.
The aim of this study is to include an appropriate turbulence model in this computational method. Therefore different methods of turbulence modelling are assessed on their suitability for the present application. A Reynolds-Averaged Navier-Stokes (RANS) eddy-viscosity model was regarded to be the most appropriate for the task. This model type is further investigated and the RANS equations have been derived. From the broad range of two-equation models, the SST model was chosen, to be implemented in the computational method. The equations of this eddy-viscosity model are then discretised in a finite-volume formulation, to adopt them in the discretisation method already used in the inviscid-flow method. Furthermore, implicit time-integration is employed to advance the solution in time.
Finally, numerical simulations were conducted to verify the correct implementation of the turbulence model. Numerical results were compared with available experimental data to validate the computational method.

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