



COLLOQUIUM

In accordance with article 4.6.8 of the SSNS-wb.

Group: Engineering Fluid Dynamics

As part of his MSc thesis assignment

P.C. Verburg

will give a presentation, entitled:

Multi-Level Wave-Ray Method for 2D Helmholtz Equation

Date: Wednesday June 23, 2010

Time: 12:00

Room: Horstring N 109

Summary:

The Helmholtz equation is an elliptic partial differential equation that describes standing waves. It is widely used in acoustics. Multi-level methods are often applied to solve elliptic differential equations. They show convergence speeds that are far greater than direct or single-grid iterative solution methods. Each frequency component in the error is represented on a scale, at which it can be accurately described and efficiently solved. As a result all error components are removed with similar efficiency.

Unfortunately standard geometric multi-grid techniques fail for the Helmholtz equation. A certain range of frequency components are insensitive to local relaxations on fine grids, whereas they cannot be removed on coarse grids due to excessive phase errors.

The current research is based on the work by Brandt and Livshits. They have proposed to add a ray-cycle to a traditional multi-grid wave-cycle to specifically deal with the problematic frequency components, whilst preserving the benefits of a multi-level method. In the present research a wave-ray method has been developed for the two-dimensional Helmholtz equation. It has been assessed for its suitability for applications in engineering.

Assessment committee:

Prof.dr.ir. H.W.M. Hoeijmakers (chairman)
dr.ir. C.H. Venner (mentor)
dr.ir. R. Hagmeijer
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ir. D.F. van Eijkeren

Chairman:

d.d.