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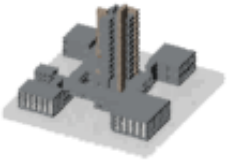

Subdepartment **Engineering Fluid Dynamics - CTW**
Department **Mechanical Engineering**

As part of his / her masterassignment

Joost Maas

will hold a speech entitled:

Wave Propagation in Cartesian and Cylindrical Multi-Layered Waveguides

Date: 06-02-2015
Time: 14:00 hr
Room: ZH-286

Summary:

The characteristics of acoustic waves propagating through multi-layered waveguides such as Cartesian layered strata in earth or cylindrical fluid-filled boreholes can be used in non-destructive testing methods to obtain information on the internal structures and material properties of these waveguides. Throughout history, several types of waves that may propagate through such waveguides have been identified and described mathematically. In general, such a description is given in terms of a dispersion relation, which relates the different wave characteristics to each other and in that way tells something about the behaviour of the wave.

The aim of this work is to construct an analytical method to provide the dispersion relation for any multi-layered waveguide in either Cartesian or cylindrical arrangement, generalized for the inclusion of solid, fluid and vacuum layers. A computational model based on the analytical method was developed that automatically generates and solves this dispersion relation based on the geometry and material characteristics of the waveguide. The model was successfully tested against examples from literature.

Using the computational model, the range of existence and the propagation characteristics of a specific type of wave, the Stoneley mode, were studied. The range of existence in several Cartesian and cylindrical cases was found to be in accordance with the analytical description obtained from literature for a basic Cartesian case. In cylindrical cases, the shape of the dispersion characteristic of a Stoneley mode propagating along the interface between to layers was found to strongly depend on the arrangement of the two layers.

Assessment committee: chairman,

prof.dr.ir. C.H. Venner	(chairman)
dr.ir. R. Hagmeijer	(mentor)
dr.ir. Y.H. Wijnant	(external member)
ir. G. Giangaspero	(internal member)

(Signature)

d.d.