



# COLLOQUIUM

In accordance with article 4.6.8 of the SSNS-wb.

Group: Engineering Fluid Dynamics

As part of his MSc thesis assignment

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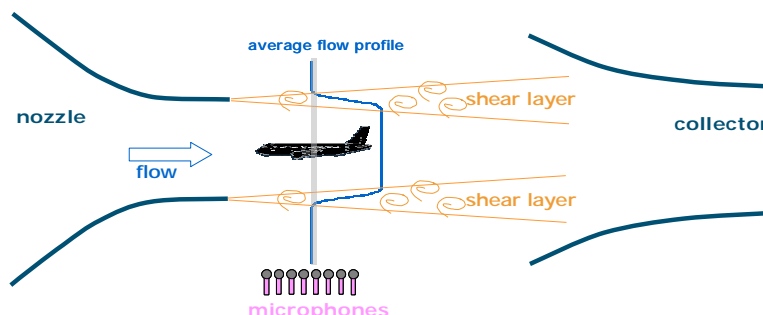
will give a presentation, entitled:

## Effect of Open-jet Shear Layers on Aero-acoustic Wind Tunnel Measurements

**Date:** Friday, November 26, 2010

**Time:** 14:00h

**Room:** Horst N109 (filmzaal)



### Summary:

Noise generated by the flow around aircraft is an environmental problem, specifically near airports. At present prediction of this aero-acoustic noise is impossible without the input from scale model experiments in wind tunnels.

Aero-acoustic wind tunnel tests are generally conducted in wind tunnels with an open-jet test section situated in an anechoic room. The anechoic walls absorb the acoustic waves generated by the flow around the model, preventing disturbance of the measurements by reflections. However, before arriving at the "far-field" microphones the sound waves from the model pass the open-jet shear layer. This causes refraction, spectral broadening, and loss of coherence between signals arriving at different microphones. These effects, which depend amongst others on Mach number and frequency as well as on both source and observer position, are currently only partially understood. This substantially hampers the interpretation of aero-acoustic measurements.

In the present study, carried out at NLR, wind tunnel tests have been carried out to characterize the aerodynamic properties and aero-acoustic effects of the open-jet shear layer. The turbulent shear layer induces spectral broadening. This implies that the energy of a single tone is distributed over a range of frequencies around the frequency of the emitted tone. Furthermore, it has been found that results of a new theoretical model are in good agreement with the present experimental results measurements.

### Assessment committee:

Prof.dr.ir. H.W.M. Hoeijmakers (chairman)  
Prof.dr.ir. A. Hirschberg (mentor)  
Dr.ir. S. Oerlemans (mentor NLR)  
Ir. J.H.M. Gooden (mentor NLR)  
Dr.ir. Y.H. Wijnant  
Ir. S.H. Jongsma

### Chairman:

September 25, 2010