Faculty Engineering Technology
Program Mechanical Engineering

University of Twente.

COLLOQUIUM

Group: **Engineering Fluid Dynamics**

As part of his MSc thesis assignment

Reinder Heukers

will give a presentation, entitled:

Parametric Study on Linear Plasma Synthetic Jet Actuators

Date: Friday January 18, 2013

Time: 14:00

Room: **HR N109**

Summary:
Linear Plasma Synthetic Jet Actuators (L-PSJA) are devices that induce synthetic jets which can be applied for flow control. An L-PSJA consists of three thin electrodes and a layer of dielectric material. Two of the electrodes are placed on the dielectric material and are exposed to the air. The third (grounded) electrode is placed embedded in the dielectric material, directly below the other two electrodes. By applying a high voltage high frequency signal, the upper two electrodes will discharge into the air and create a plasma. The plasma region in the electric field causes an ionic wind directed from the exposed electrode to the location of the embedded electrode. These two opposing wall jets collide, resulting in a jet perpendicular to the dielectric surface.

Because the physics of plasma actuators is not yet fully understood, it is difficult to optimize these actuators. In the present study, three geometric parameters and the applied voltage are varied in order to investigate their effect on the momentum transfer to the air and on the power consumption of the actuator. To increase the robustness of the actuator and to be able to vary the electrode thickness, coated copper wires are chosen as exposed electrodes over the conventional copper tape. In order to determine how much momentum is transferred to the air, the flow field is measured by means of Particle Image Velocimetry (PIV). The power consumption is measured by monitoring the applied voltage and an indirect measurement of the current. An attempt has been made to match the measured flow field with that of the similarity solution of a turbulent jet. This yields an estimate of the strength of the L-PSJA, which could be used in follow-up numerical and experimental studies on the application of the L-PSJA for flow control.

Assessment committee: **Chairman,**

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