



COLLOQUIUM

Conform artikel 4.6.8 van het SSNS-wb.

Vakgroep: Technische Stromingsleer

In het kader van zijn doctoraalopdracht zal

Tjeerd Schuitemaker

een voordracht houden getiteld:

Modeling and simulation of active flow control using a Single Dielectric Barrier Discharge Plasma Actuator

Datum: 17 oktober 2008

Tijd: 14:00 uur

Zaal: HR Z 286

Summary:

Active flow control is used to adjust and improve the fluid flow over wings and control surfaces. One example of an active flow control technique is the use of a *Single Dielectric Barrier Discharge (SDBD) Plasma Actuator*. This plasma actuator contains two thin metal strips, *the electrodes*, one positioned at the surface exposed to the flow, the other is positioned immediately downstream, sub-surface in an isolating dielectric layer, *the barrier*. When a high voltage signal is applied, plasma will be formed above the encapsulated electrode, inducing acceleration in the gas, away from the exposed electrode. Plasma is *ionized* gas, which means that it contains large amounts of charged particles. Therefore plasma is, in contrast to normal gas, *highly electrical conductive*.

The aim of this work is an extensive study on the state-of-the-art of the SDBD plasma actuator design, the physics behind the actuator, and an evaluation of the available mathematical models designed to predict or describe the behavior of the actuator. The most suitable model is used to investigate the use of the plasma actuator on a 2D NACA 0012 airfoil section, in order to increase the angle of attack at which maximum lift is reached. This simulation is performed with a state-of-the-art CFD method at the National Aerospace Laboratory NLR.

Examencommissie:

Prof.dr.ir H.W.M. Hoeijmakers (afstudeerdocent)

Dr.ir. J.C. Kok (mentor)

Dr.ir. R.G.K.M. Aarts

Ir. H. de Vries

Dr.ir. D.R. van der Heul

De afstudeerdocent,

d.d. _____