

COLLOQUIUM

Group: Engineering Fluid Dynamics

As part of his MSc thesis assignment

R.F. van der Sluis

will give a presentation, entitled:

Experimental Analysis of Aerodynamics of Speed Skating Suits

Date: Friday July 18, 2014

Time: 14:00

Room: Horst Building Room N.109

Summary:

During the Sochi Winter Olympics the speed skating suits used by the athletes were a hot topic. These suits were aerodynamically improved to gain an advantage over the competition. Large contributors to the aerodynamic drag of a skater are the legs and arms of the athlete. These are parts of the body perpendicular to the flow, generating primarily pressure drag due to flow separation. In the literature and in the design process of new speed skating suits the limbs of the athlete are often approximated by a circular cylinder. Blunt bodies, like cylinders, are known to experience a sudden drop in the drag coefficient (the "drag crisis") as the Reynolds number exceeds a critical value. The Reynolds number at which this drop occurs is higher than the Reynolds number of the flow around a speed skater. Applying surface roughness will shift the drag crisis to a lower Reynolds number.

In the literature the aerodynamics of circular cylinders covered with rough fabrics has been widely studied. However, not much research has been done on the similitude of the flow around a circular cylinder and the flow around a 3D shaped leg or arm.

In the present research an experimental study has been conducted to determine whether aerodynamically a circular cylinder is an appropriate approximation of the limbs of a speed skater. Two experimental set-ups have been designed and tested in the wind tunnel of the University of Twente: a circular cylinder and a model of a human leg. For these two configurations, covered with fabrics ranging from smooth to rough, the drag force and surface pressure distribution have been measured.

Results from these two experiments have been used to analyse the influence of the roughness of the fabrics on the aerodynamic resistance and to determine the similitude between the flow around a circular cylinder and the flow around a speed skater.

Assessment committee:

Prof.dr.ir. H.W.M. Hoeijmakers (chairman/mentor)

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Chairman,

d.d. _____