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Wind Profiling and Pressure Distribution for an Airfoil Model in a Wind Tunnel

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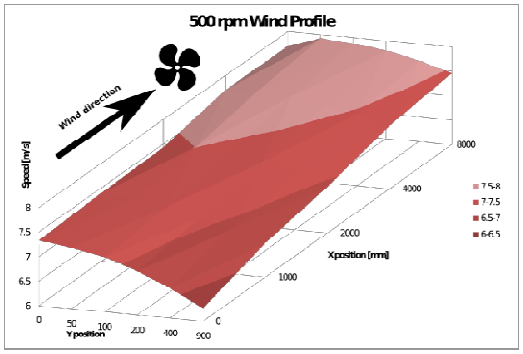
Since 2007, DISAL has acquired a fair amount of equipment for the wind tunnel operation. The first part of my report deals with the various instruments that are available now. Some guidelines are given to aid the experimenter and facilitate the work in the wind tunnel.

The traversing system is currently operative through a TCP/IP text-based interface, a GUI, and two different LabView toolboxes. Each one of these platforms has been tested and is briefly described in the report. The hot wire anemometry system is a delicate and precise piece of equipment. The report describes how to set up the connections, calibrate it (two-point and multipoint), and acquire data. Both the LabView interface and the MiniCTA bundled software are described. The pressure system has been setup as well, and runs both with the built-in software and with the LabView interface provided by the manufacturer. Also, a Pitot tube has been temporarily mounted near a wind tunnel wall as the velocity reference. Another one can be attached to, and moved, with the traversing system.

After the initial set-up, I carried out a number of experiments to validate the behaviour of the various equipments. Each experiment involved one piece of equipment and had the purpose of testing and assessing its functionality. The performed experiments were:

- *Vortex shredding measurements*, with the bridge model as a still bluff body. To test the hot wire anemometer in varying speed fields, and to get more information about the bridge behaviour in windy conditions.
- *Scan of the wind tunnel speed profile*, with the hot wire anemometer and the traversing system, to provide some data for planning future experiments. An example figure is above. Turbolence data was also acquired.



- *Amplitude of bridge oscillations*, employing the laser sensors, to provide a baseline against which to compare the active system.
- *Comparison of the Pitot tube and hot wire anemometer*, for future experiments using the Pitot tube as a speed reference.
- *Pressure distribution on the SmartBridge flap*, to test the design, the pressure system, and provide data for the control system design.