Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Design of an anemometer to characterize the flow in the ducts of a hydrogenerator rotor rim[1] KEVIN VENNE, LAURENT MYDLARSKI, McGill University, FEDERICO TORRIANO, JEAN-PHILIPPE CHAREST-FOURNIER, CLAUDE HUDON, JEAN-FRANCOIS MORISSETTE, IREQ (Hydro-Quebec) — Due to its complex geometry, the airflow within hydrogenerators is difficult to characterize. And although CFD can be a reliable engineering tool, its application to the field of hydrogenerators is very recent and has certain inherent limitations, which are due in part to geometrical and flow complexities, including the coexistence of moving (rotor) and stationary (stator) components. For this reason, experimental measurements are required to validate the CFD simulations of such complex flows. To this end, a 1:4 scale model of a hydrogenerator was constructed at the IREQ (Hydro-Québec Research Institute) to better understand the flow dynamics in the rotor and stator components, and to help benchmark its CFD simulations. However, new flow sensors must be developed to quantify the flow in the confined and harsh regions of hydrogenerators. Of particular interest is the flow within the rotor rim ducts, since it is directly responsible for cooling one of the most critical components, the poles. This rather complex task required the design of an anemometer that had to be accurate, durable, cost-effective, easy to install, and able to withstand the extreme conditions (temperatures of 50C, centrifugal forces of 300g, etc.) found in hydrogenerators. This paper presents two preliminary designs of such sensors and a series of tests that were performed to calibrate and test them.

[1]Funding graciously provided by the NSERC and FRQNT

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Date submitted: 29 Jul 2016 Electronic form version 1.4