

Abstract: This paper presents a capacitive and a vision-based method for measuring the velocity of cryogenic hydrogen flows. The capacitive sensing principle exploits the spatial frequency signature of perturbations moving through a multi-electrode structure. This setup increases the sensitivity to dielectric permittivity variations compared to a simple two-electrode structure while preserving the ability to detect small perturbations. The vision-based method relies on a high-speed camera system that monitors the liquid hydrogen flow through an optical window yielding the flow velocity by crosscorrelating subsequent images of the flow. Although a comprehensive analysis of the obtainable measurement uncertainty was not performed yet, current measurement results show the applicability of both principles for the non-invasive measurement of the volume flow of cryogenic fuels inside conveyor pipes. *Copyright © 2009 IFSA.*

Keywords: Flow velocity measurement, Cryogenic media, Capacitive sensing, Optical sensing, Noninvasive measurement