Contribution ID: **354** Type: **Contributed Oral**

C4Or1C-05: Basic design of a cryogenic liquid hydrogen pump and of a laboratory-scale test rig

Thursday 13 July 2023 11:00 (15 minutes)

As the hydrogen market expands, the need for efficient distribution of liquid hydrogen (LH2) becomes more important. On the one hand, there is a need to reduce flash gas losses during the transfer of LH2. On the other hand there is often a demand for pressurisation of LH2 to overcome transfer losses or to meet minimum input pressure requirements of downstream applications like fuel cells or combustion engines. It is therefore essential to develop pumps for liquid hydrogen. Consequently, a test rig is necessary to characterise their behaviour. In order to perform continuous measurements with a comparably small amount of liquid hydrogen it is designed as recirculation loop. The development of a submersible pump involves multiple engineering related challenges. This paper presents the general concept of a submersible liquid hydrogen pump and discusses several design decisions. It also gives an insight into the built test rig and its capabilities and instrumentation.

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Session Classification: C4Or1C: Hydrogen V: Aerospace Tanks