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Title

Simulation of Safety Relevant Aspects of LH₂ Systems

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Abstract

Liquid hydrogen (LH₂) is used as fuel for space propulsion since decades, especially at the Institute of Space Propulsion in Lampoldshausen, Germany. Currently, there are many activities, to transfer the LH₂ technology to other applications, especially aerospace. DLR is involved in several projects with the goal to realize zero-emission air transport [1].

During the development of a LH₂ system, safety aspects have to be considered to ensure proper functionality and minimize safety risks. At DLR different methods and simulation tools are used of LH₂ systems, e.g. commercial tools like ProNuSs [2] or Ansys CFD [3], as well as open source tools like Hynam [4], and inhouse tools.

Besides the proper choice of the tools, it is essential to use valid properties and boundary conditions. Regarding the boundary conditions it is crucial to consider normal operation, stand-by, and worst-case scenarios.

The methodology, tools, and first results will be presented using the example of the planned LH₂ ground infrastructure for re-/ and defueling a research aircraft, the Do228 [8]. This ground infrastructure will be erected at DLR site in Oberpfaffenhofen, and will serve for fueling a modified Do228 with LH₂ for flight tests in 2026.

References

- [1] <https://www.dlr.de/content/en/dossiers/2019/emission-free-flight.html>
- [2] <https://pronuss.de/>
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