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# Pressure peaking phenomenon for LH<sub>2</sub> releases in confined spaces – CFD modelling

6<sup>th</sup> stakeholders' workshop

Belfast, United Kingdom

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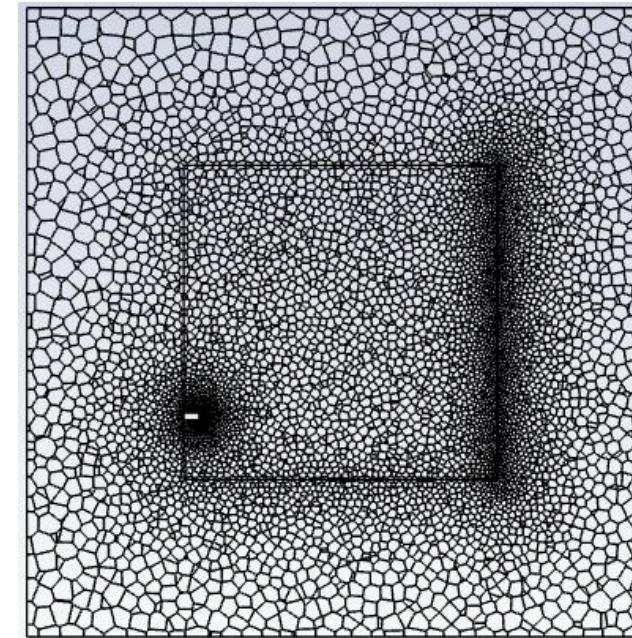
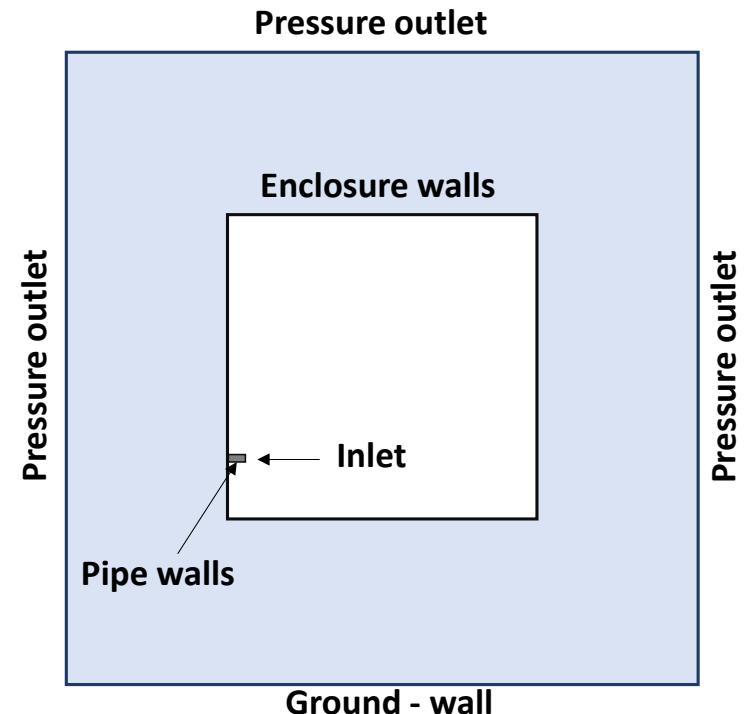
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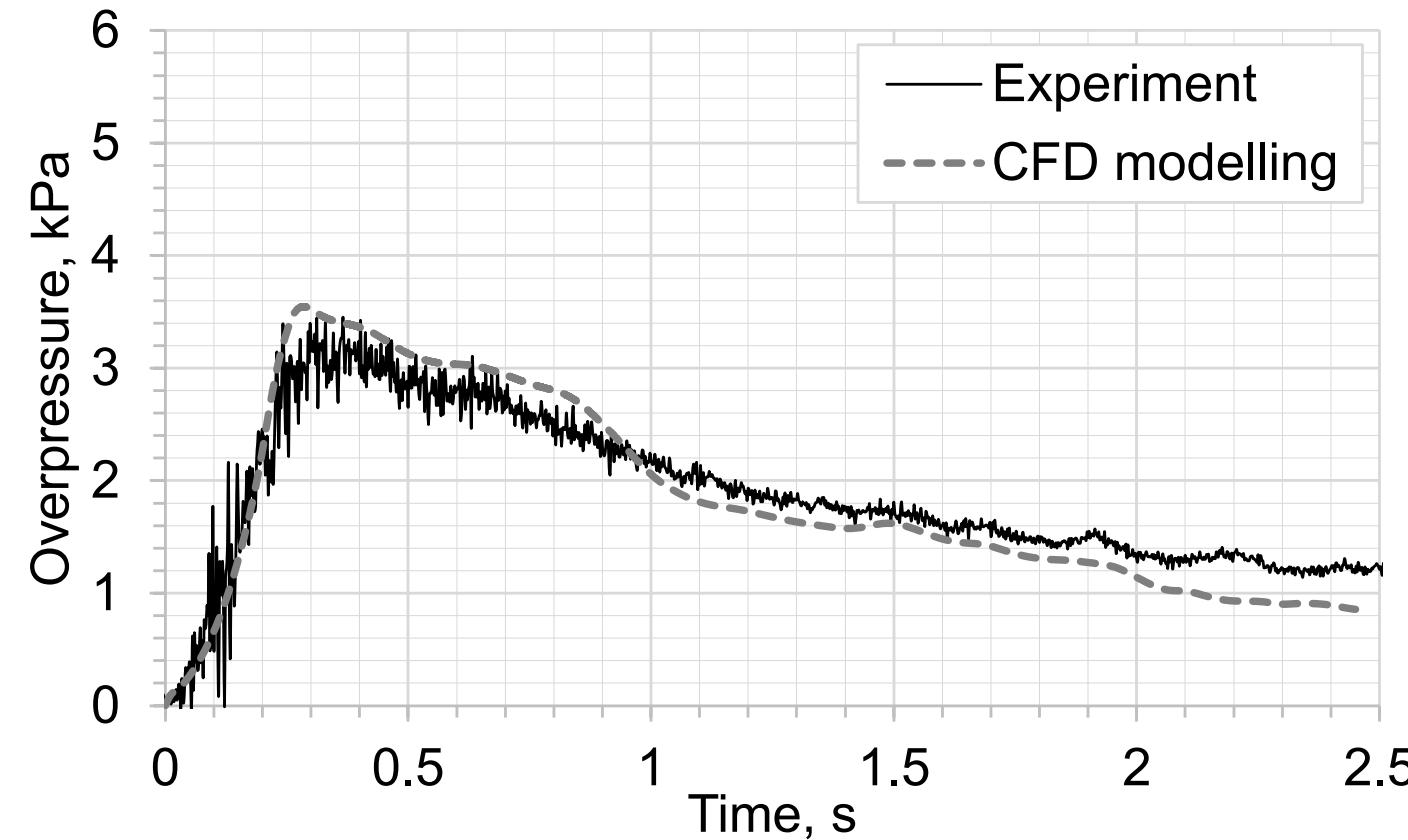
# CFD approach and numerical domain

- SST  $\kappa$ - $\omega$  approach for turbulence modelling.
- Volume of Fluid for multiphase modelling with Lee's model for evaporation and condensation.
- NIST properties database to characterise the two-phase hydrogen flow and mixture with air.
- The numerical domain is a polyhedral grid including the enclosure and external atmosphere.



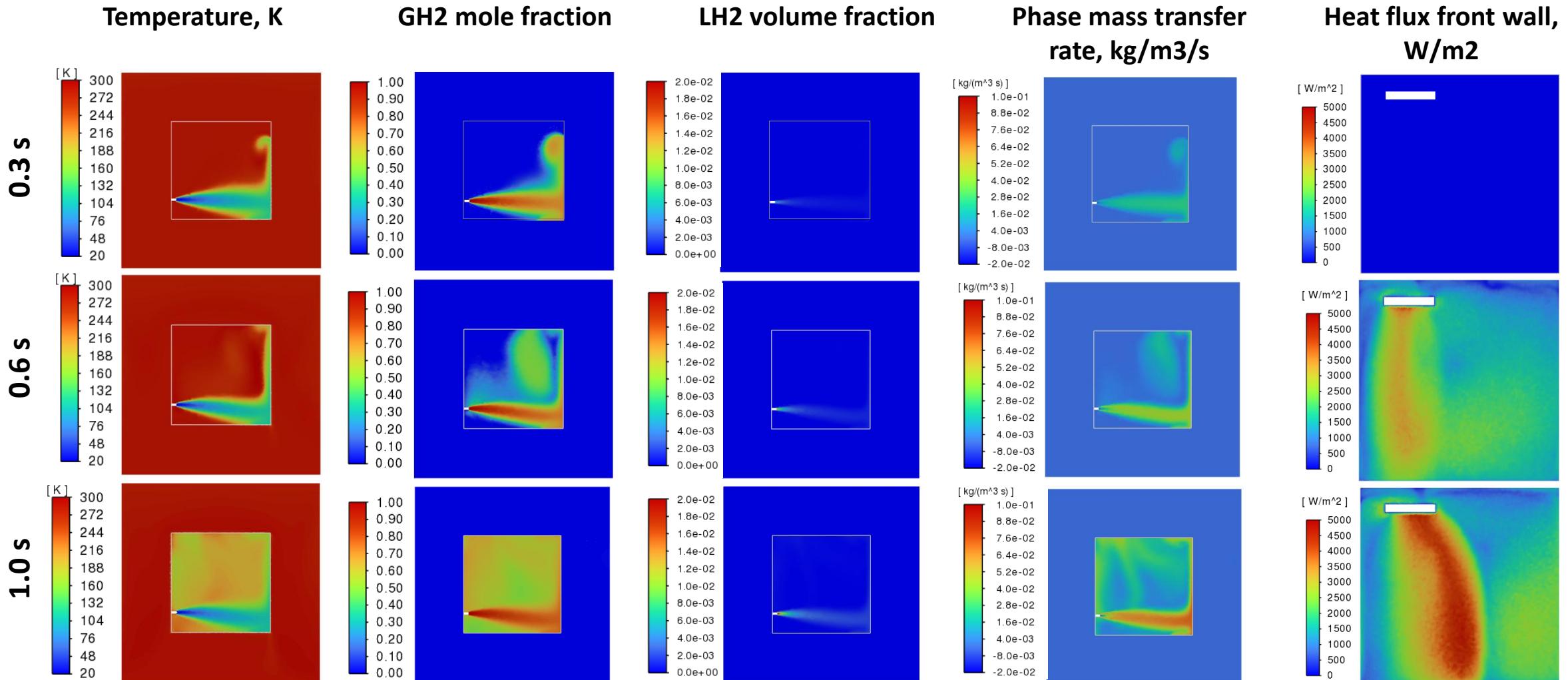
# CFD results: overpressure dynamics

Test 3: one passive vent open



# CFD results: mass and heat transfer dynamics

## Test 3: one passive vent open



# Conclusions and future research

- The PPP overpressure peak occurs within the first fractions of seconds from the start of the release.
- The PPP overpressure peak and dynamics is strictly dependent on the characteristics and phase composition of the multiphase flow, which can significantly vary during the initial stage of the LH<sub>2</sub> release.
- Accurate modelling requires precise definition of the experimental set-up and measurements across the entire line from a storage tank through the piping system to the atmosphere.
- Further research should be performed on advancing the understanding of two-phase flows from LH<sub>2</sub> equipment.



# Thank you for your attention

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