PRESLHY

Newsletter

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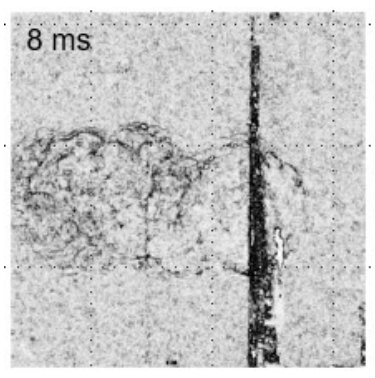
Top stories in this newsletter

PRESLHY Dissemination conference



Conclusion of experimental tests on cryogenic jet fires

Progress of experimental campaign on LH_2 pools

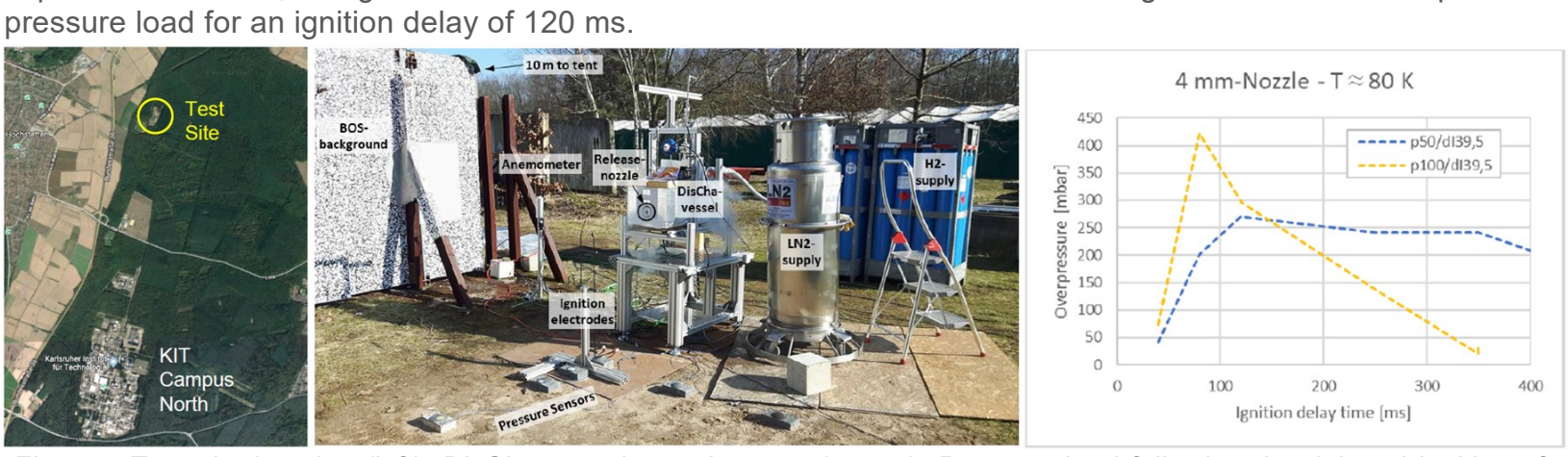
First announcement of PRESLHY dissemination conference

We are pleased to announce that PRESLHY dissemination conference on pre-normative research for safe use of liquid hydrogen will be held on the **5-6 May 2021** in **Athens, Greece**. Speakers from PRESLHY consortium will present the results of the outstanding research performed on the major phenomena associated to the release and dispersion of liquid and cryo-compressed hydrogen, the ignition of cryogenic hydrogen-air mixtures and their combustion. The conference will address the potential impact of the project outputs on the international community working on hydrogen and fuel cell technologies. Presentations by invited international speakers will enrich the conference program, providing a throughout overview of the state of the art and worldwide research on safety of liquid hydrogen.

Visit PRESLHY website to find more about the conference and the tentative program!

Experimental series on DisCha ignited releases was completed!

The DisCha experimental facility for the tests on ignited hydrogen releases was moved to a remote free field of KIT– Campus South for safety reasons. Approximately **300 tests** were performed to characterize the thermal and pressure hazards from hydrogen ignited releases at ambient and cryogenic temperatures. Experimental tests were completed in February 2020. The experimental set up included five cameras for investigating the jet fires using a BOS technique and one infrared camera for temperature/heat flux measurements. The maximum pressure load for hydrogen release from a 4 mm diameter was reached with an ignition delay of approximately 80 ms. Maximum overpressure was found to be up to 3 times higher for the cryogenic releases at 80 K compared to releases at ambient temperature. About 100 tests were performed on cryogenic hydrogen releases at 80 K from three nozzle diameters (d = 1, 2, 4 mm) at four initial pressure in the range 5-200 bar. In one experimental series, the ignition distance was varied from 40 to 200 cm to investigate its effect on the produced pressure load for an ignition delay of 120 ms.



Figures: Test site location (left); DisCha experimental set-up (centre); Pressure load following the delayed ignition of a cryogenic hydrogen release at 80K and d=4mm (right).

Experimental campaign on evaporation of LH_2 spills and their ignition

The experimental campaign aimed at the generation and characterization of a LH_2-pool above different substrates as concrete, gravel and sand. Twenty-six thermocouples were employed to monitor the temperature within the substrate material, within and above the LH_2 pool. The experimental set up included hydrogen concentration sensors and a scale to assess the weight of a LH_2 pool. Subsequent tests on a same substrate allowed to investigate the evaporation rate for different initial temperature of the substrate, starting from the ambient temperature to approximately 80 K and finally to an even lower temperature depending on the substrate.

It was observed that the evaporation rate for the gravel substrate was significantly higher than for other materials. Experimental tests introducing a fan with ventilation rate of 5 m/s did not show any significant effect on the evaporation rate.

Ignition above the formed LH_2 pool produced an highly energetic event. The final stage of experiments aims at investigating the danger of flame propagation over a spill of LH_2 in presence of inverse vertical hydrogen concentration gradients at cryogenic temperatures above the LH_2 pool. The experiments were completed by the end of summer 2020.

Figure: Experimental set-up for LH_2 pool investigation

Investigation of flame acceleration and DDT at cryogenic temperatures

This experimental campaign addresses the combustion of H_2-air mixtures in a 5 m obstructed tube at cryogenic temperatures. The shock tube is equipped with thermocouples, pressure sensors and phototransistors to investigate the flame acceleration and DDT for different hydrogen content and blockage ratio (BR: 30% and 60%). Hydrogen-air mixtures at ambient and cryogenic temperature are being investigated to assess the effect of cryogenic temperature on combustion.

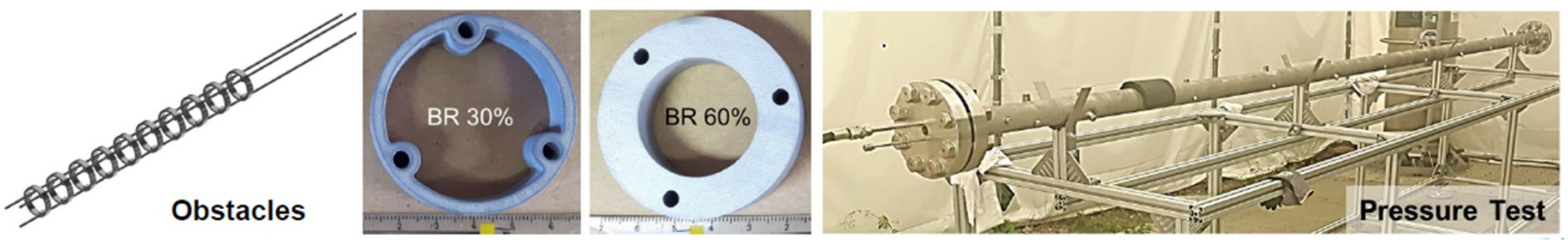


Figure: Experimental facility for combustion tube experiments.

Forthcoming events

Please note that future events may be affected by current restrictions associated to Covid-19 pandemic.
⇒ PRESLHY dissemination conference, Athens, Greece (5-6 May 2021)

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To find more information about our research activities, please visit: www.preslhy.eu
Next edition newsletter: Issue 5, May 2021