Hydrogen dispersion in a closed environment

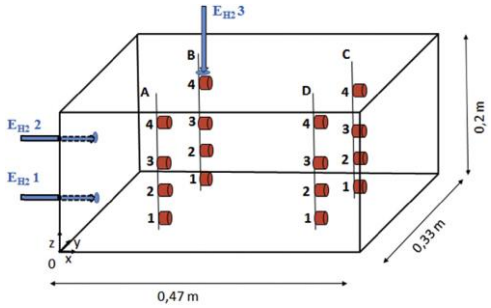
EDF DIPNN - Direction Technique and INSA-CVL

The highly combustible nature of hydrogen poses a great hazard, creating a number of problems with its safety and handling. As a part of safety studies related to the use of hydrogen in a confined environment, it is extremely important to have a good knowledge of the dispersion mechanism.

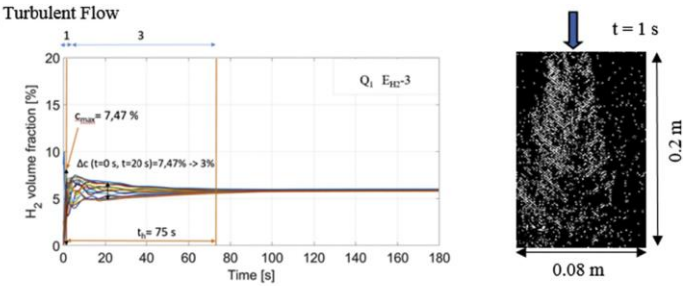
XEN-5320 Gas sensor with USB read-out

The performed tests evaluated the influence of the initial conditions at the leakage source on the dispersion and mixing characteristics in a confined environment. Throughout the test, during the release and the subsequent dispersion phase, temporal profiles of hydrogen concentration are measured using thermal conductivity sensors within the enclosure. In addition, the BOS (Background Oriented Schlieren) technique is used to visualise the cloud evolution inside the enclosure. These instruments allowed the observation and quantification of the stratification effects.

The hydrogen concentrations were measured using the XEN-5320 thermal conductivity gas sensor. The small dimensions (sensor diameter d = 0.005 m) and the data rate (3 Hz) made it possible to measure the hydrogen concentration pointwise every 0.33 s.



Experimental enclosure scheme and sensor positions



Volume fraction of hydrogen in function of time during the injection and dispersion phases for the 16 sensors

Passages from original work are primarily used to illustrate the use of thermal conductivity sensor XEN-5320 within an experimental application. Please contact the original authors or official distributor for the full publication.

Reference

De Stefano M, et al., Hydrogen dispersion in a closed environment, International Journal of Hydrogen Energy (2018), https://doi.org/10.1016/j.ijhydene.2018.06.099