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Adisa is a chemical engineer and a graduate master's student in the Hydrogen Systems and Enabling Technologies (HySET) Erasmus Mundus program, with academic experience at Politecnico di Torino (Italy) and Universitat Politècnica de Catalunya (Spain). Her master's thesis, supervised by Shell and both home universities, focuses on the safety of hydrogen vents. The project, titled *"Advancing Overpressure Quantification Methodology for Hydrogen Venting,"* reflects her commitment to improving safety standards in hydrogen facilities. She has also co-authored a paper, "Towards a Reliable Methodology for Assessing Overpressure in Hydrogen Vents," presented at the International Conference on Hydrogen Safety (ICHS) 2025.

Adisa's academic and professional interests lie in the areas of renewable energy, alternative fuels, energy transition, the hydrogen value chain, and safety. She strives to bridge the gap between research and industrial application in the energy transition.

Abstract

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Title: Advancing Overpressure Quantification Methodology for Hydrogen Venting

Hydrogen is increasingly important in the low-carbon energy transition, making its safe production, transport, and storage essential. Like other storage systems, hydrogen facilities require venting for both normal and emergency conditions. A major safety issue today is the lack of a standardized methodology to quantify blast loads from hydrogen (H_2) vents. Of particular interest is the delayed ignition of unconfined uncongested flammable clouds formed during controlled or uncontrolled H_2 releases. Prior work aimed to improve an existing methodology to enable more sensible predictions of deflagration and detonation overpressures in hydrogen venting scenarios. The original methodology was found to perform poorly against recently acquired experimental data showing significant over-/under- predictions when using the detonation and deflagration correlations, respectively. While a degree of conservatism is typically preferred, justifying the retention of detonation as an upper limit of a given release condition, estimates should remain realistic and aligned with expected physics, emphasizing the need to improve deflagration modeling. To that end, an improved deflagration model was proposed, introducing a new approach to estimate visible flame speed (V_f) using the vent release conditions (i.e., vent pressure, temperature, and diameter). A clear relationship between measured V_f and the Reynolds number (Re) at the vent exit was observed, enabling V_f prediction as a function of Re through linear regression. This paper is a follow-up to previous work, where the original and updated methodologies are tested and compared against large-scale experiments carried out by Air Products. The updated deflagration overpressure model significantly improves accuracy, increasing predictions within a factor of two from 7.5% to 32.5%.