Combustion Modeling using EUROPLEXUS Code

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Abstract

Most of the numerical benchmarks on hydrogen safety, performed up until today, demonstrated that current numerical codes and/or physical models experience poor predictive capabilities at the industrial scale, which could be explained by the deficiencies in combustion modeling and under-resolution. The EUROPLEXUS code was recently validated against several large and medium scale experimental datasets, inlcluding obstacle-laden channels, interconnected reactor-type compartments, vented enclousures, etc, [1]. A combustion model employed in the code was seen to modify a burning rate and a flame surface behind the obstacles, in expansion areas, as well as likely due to interaction with pressure/shock waves. One of the important features of the reported work was ability to validate the code in view of various combustion regimes (slow, fast and detonation) with moderately accurate or conservative results by fixing the combustion model parameters. In this study we present the model validation at a relatively small scale in terms of flame dynamics, pressure transients and schlieren photographs.

Keywords
Combustion modeling, hydrogen safety, flame acceleration

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