

A Numerical Study on the New Slit Flame Combustor Design to Control Hydrogen Flame Shape

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Abstracts

The hydrogen society aims at fuel conversion from fossil fuels to carbon-free fuels. Accordingly, conventional industrial equipment is being developed to enable hydrogen utilization. However, almost conventional combustors had a conical flame, which makes it difficult to control hydrogen combustion. Due to the fast-burning velocity of hydrogen, it is necessary to develop a new flame shape combustor that can easily control the burning velocity. This study designed a new hydrogen combustor that forms a slit flame. The new slit flame combustor is applied partial-premixed combustion technology to enable the burning velocity control with a slow reaction effect. The slow reaction effect came from the flame sectors with different air ratios inside the combustor. In this study, the combustor and the header were modeled to form slit flames. Commercial CFD analyzed the flame shape and length, the combustor pressure, and the partial premixing. As a result, the slit flame was formed at the combustor header, and the flame length increased as the header moved into the combustor.

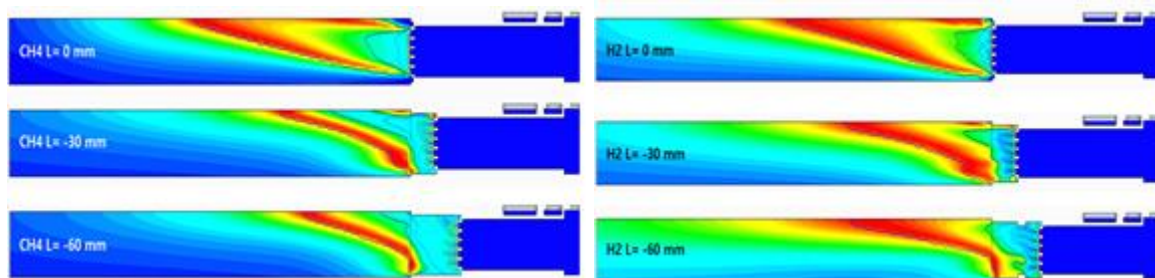


Figure 1: Computational analysis for flame length and shape between methane flame and hydrogen flame.

This work supported by the Carbon Innovation Stars Project (20018190, development of 0.5 ton/hr-Hybrid Hydrogen Burner with Slit flame) funded By the Ministry of Trade, Industry & Energy(MOTIE, Korea)