عنوان مقاله:

The effect of molecular diffusion on the flow field of hydrogen enriched Methane-AIR stratified swirl burner

محل انتشار:

نهمین کنفرانس سوخت و احتراق ایران (سال: 1400)

تعداد صفحات اصل مقاله: 10

نویسندگان:

Sajjad Rahimi - *MSc student, Mechanical engineering, Tarbiat Modares University, Tehran, Iran*

Kiumars Mazaheri - *Professor, Mechanical engineering, Tarbiat Modares University, Tehran, Iran*

Alireza Alipoor - *Assistant professor, Mechanical engineering, Shiraz University, Shiraz, Iran*

,Amirreza Mohammadpour - *Phd candidate, Mechanical engineering, Tarbiat Modares University, Tehran, Iran*

خلاصه مقاله:

This article investigates the effects of molecular diffusion and utilizing unity and specific Schmidt numbers for species on the results of the simulations, in the presence of highly mobile species H۲, in the fuel stream, while stratification and swirl are used for flame stabilization. In addition, we have characterized regions where both molecular diffusion and turbulent transport play a significant role. For this purpose, a stratified swirl burner called the Cambridge-Sandia burner will be used as a case study. A total of ۴۰% hydrogen (on a volume of fuel basis) is added to both slots of the burner. Two models are used: (i) the Schmidt numbers for all species are equal to unity, and the Sutherland coefficients are constant for all of them, and (ii) species-specific Schmidt numbers and Sutherland coefficients are taken into account. It is investigated how different models affect various flow fields, such as velocity, temperature, and species mass fractions. The PaSR combustion model, and the SST turbulence model, are used in our computational method. It is shown that by adding hydrogen and in the presence of stratification, preferential diffusion of lighter species affect temperature, as well as H۲ mass fractions, so it cannot be overlooked. In premixed case, it has a minor .influence on species concentration, but it still affects temperature distributions

کلمات کلیدی:

molecular diffusion, hydrogen enrichment, stratified burner, Schmidt number