

عنوان مقاله:

On the Dependence of Soot Formation and Combustion on Swirling Combustion Furnaces: Measurement and Simulation

محل انتشار:

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خلاصه مقاله:

Soot concentration distribution is investigated both numerically and experimentally in methane-air diffusion flame. The experimental work is conducted with a cylindrical swirl stabilized combustor. Filter paper technique is used to measure soot volume fraction inside the combustor. The numerical simulation is based on the solution of the fully-coupled conservation equations for swirling turbulent flow, chemical species kinetic modeling, fuel combustion and soot formation and oxidation. The soot particle number density and the mass density based on the acetylene concentrations are used to model the soot emission in confined swirling turbulent diffusion flame. The comparison between predictions and measurement results over a range of different swirl numbers shows good agreement. The results reveal the significant influence of swirl intensity on combustion characteristics and soot formation in diffusion flames. An increase in swirl number enhances the mixing rate, peak temperature, and soot volume fraction inside the flame zone. The locations to give the maximum temperature and soot concentration shift to backward (close to combustor inlet) with increase in swirl number.

کلمات کلیدی:

لینک ثابت مقاله در پایگاه سیویلیکا:

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