

Investigations of characteristics of microjet CH₄ diffusion flames

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Abstract

Characteristics of microjet methane diffusion flames stabilized on vertical straight stainless-steel tubes with nominal diameter ranging from 150 to 770 μm are investigated. These flames are potential energy sources for future micro power generators. Of particular interest are the flame shape, flame length, and quenching limit, as they have direct bearing on the minimum size and power of the devices in which such flames would be used. Experimental measurements of flame shape, flame length, and quenching velocity are compared with theoretical predictions. Comparisons of the measured flame heights, flame shapes, and quenching velocities with theoretical predictions indicate that a simple jet flame model can not properly predict the characteristics of microjet methane flames. However, with a modification of the model, the predictions are in good agreement with the measured data. Comparisons of predicted quenching velocity with measured results indicate that quenching occurs when the flame length equals the standoff distance.

Keyword : Microjet flames, Flame shape, Flame length, Quenching limit