

Study of soot formation process during hydrocarbons combustion by the 2D-LII method

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The process of soot formation during combustion and pyrolysis of hydrocarbons is an important phenomenon associated with a number of practical applications, human health and climate changes. In addition, reliable information about the properties and morphology of soot particles is important for calculating heat and mass transfer in combustion chambers, boilers and other reactors.

One of the useful methods in this field is the well-known and widely used laser-induced incandescence (LII) method. Two-dimensional laser-induced incandescence (2D-LII) and time-resolved laser-induced incandescence (TiRe-LII) methods are the promising laser-optical methods for studying the soot formation along the flame height. In this study the results of 2D-LII and TiRe-LII methods implementation for the investigation of the early stages of the soot particles formation and growth during the hydrocarbons combustion are presented.

The laminar flat premixed ethylene-, and acetylene-air flames with the addition of 0-30

As a result of the conducted research, spatially and time resolved flame particles incandescence signals using 2D-LII and TiRe-LII methods were registered. The profiles of the volume fraction and particle sizes of the studied particles from the obtained ICCD images of the flame using a LII mathematical model and attenuation of the incandescence signals have been extracted.

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