Investigation of flame monitoring systems and development of an evaluation approach

Background
In order to evaluate the burner operating conditions and characteristics of the produced flame a monitoring system is essential. The fuel and burner characteristics determine the flame properties. The intensity of the produced light as well as the stability of the flame are important parameters regarding flame characterization. Several studies have been carried out regarding flame evaluation approaches. However, distinct experimental conditions require detailed investigation in order to determine the most suitable monitoring system. Each method has its own advantages and disadvantages where needs to be identified and considered in order to be utilized as a monitoring system. Among the monitoring systems, visual observation of the flame and post processing of recorded data are of high interest in flame research.

Aim and approach
Within the scope of a research project relating to ignition of coal particles with the help of an electrical ignition system, the early stages of ignition and flame formation in an experimental burner with the capacity of 500 kW will be investigated. A visual system is used to record the flame state. A post processing method needs to be developed in MATLAB for the investigation of flame geometry and intensity as well as the stability and flickering of the flame. The flame characteristics will then be compared from different experimental conditions such as different burner loads and different air to fuel ratios to identify the influence of experimental parameters on the flame.

Task
1. Literature review of different flame monitoring systems
2. Development of a post processing method in MATLAB
3. Evaluation of the flame characteristics based on the developed method
4. Comparison of different flame states

Requirements
- Interest in programming with MATLAB
- Basic programming knowledge is beneficial
- Working independently

Starting date: Immediately

Interested student please contact
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