Development of a stable flat flame configuration in the counterflow burner rig

Background
In many combustion studies, a flame obtained in laboratory must be stable and well-characterized in terms of its geometry. There are several methods to get such a flame, and one of them is a counterflow configuration. The counterflow burner consists of two symmetrical nozzles, and a mixture of reactants flows through them, forming two jets which then meet at the symmetry plane. Due to an axial velocity gradient, a stationary flat flame can be stabilized in this configuration without any heat losses to the burner. In a perfect case, the quality of the flame depends mostly on the geometry of the inner burner. However, different parameters, e.g. heating of the upper burner by combustion products, or non-uniformity of the initial flow, can also affect the final jet configuration. Thus the present project will be aimed at finding a range of conditions where a stable and flat flames can be achieved.

Project Description
The goal of this project is to investigate the performance of the existing counterflow burner rig, to propose the possible ways for achieving stable and flat flames, to design a technical solution(s) and to test its operation. The project will therefore contain both a study and evaluation of the existing knowledge about the counterflow flame configuration and an experimental investigation of the flame geometry of the existing and improved setup. The latter will include the velocity profile measurements by means of Particle Image Velocimetry.

Prerequisites
This will be a challenging project, and will require both theoretical understanding and practical engineering skills. Therefore, a background in physics, mechanical engineering, energy sciences or similar will be of great help for a potential candidate.

Period
The project is planned to last one year, and can start as soon as possible.

Contact
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