UCI CI-SS Laboratory Exercise

Coflow Diffusion Flame – temperature and imaging

The coflow burner is a classic flame configuration that can be run in premixed, non-premixed, inverse, or partially premixed flame modes depending on what is fed to the inner flow jet and what is fed to the outer coflow region. This experiment is using the coflow burner in standard non-premixed mode where the central jet is fuel (propane) and the outer coflow is air. This flame is then a controlled candle flame where the oxidizer is delivered proactively rather than permitting natural convection to drive it. Under some flow conditions it is possible to observe the formation, growth, and oxidation of soot as well. This experiment is to establish a steady coflow nonpremixed flame and to then probe the thermal structure of that flame with a thermocouple. At the same time the flame will be visualized using its chemiluminescence (CH* primarily) and soot incandescence, and the thermal gradients and profile will be visualized using shadowgraph or schlieren imaging. As seen in the graphic, this experiment just brushes the surface of this important canonical flame. In keeping with the research theme, the tasks are not rigidly defined but are designed to encourage exploration within the parameters of the following components: