DBD plasma assisted combustion for 1D flat flame

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The potential use of non-equilibrium plasma for ignition and combustion control has garnered increasing interest due to the possibility of plasma-assisted approaches for ignition and flame stabilization. During the past decade, significant progress has been made toward understanding the mechanisms of plasma–chemistry interactions, energy redistribution and the non-equilibrium initiation of combustion. The main ideas are the possibility to apply electric fields for stabilization of the flames, reducing soot formation, increasing flame velocity, extending flammability limits.

### Experimental study

1D flat flame experimental setup is considered in this study for better understanding of the flame behavior under plasma condition as well as validation of the plasma/flame simulation results. The schematic of the experimental setup is shown in figure (1), consisting of two parts; the plenum chamber(bottom) and burner head (top). The goal of this setup is to create a uniform flow toward the burner head to ensure 1D flat flame configuration.

### Numerical study

One dimensional Plasma-flame interaction with reduced chemistry using COMSOL software for single hole (0.5mm diameter) to study the effect of the non-equilibrium plasma on the emission, temperature and flame stabilization.