In many industrial cases, a swirling flow is imposed to the turbulent jet flow which can affect the mean flow characteristics. In this research, a swirl flow from a premixed gas burner has been investigated. Experiments on a swirl stabilized pre-mixed gas burner were conducted to analyze flow characteristics at the outlet. Air at near atmospheric pressures was used as the cold-flow gas. The central main flow was perturbed by using an acoustic speaker at the base of burner. The tangential swirl flow rate was set to different values to adjust the swirl number and mixing ratio. A hot-wire anemometer was used to measure the velocity magnitudes near the outlet at different heights and swirl numbers. Particle Image velocimetry (PIV) was applied to visualize the flow. The burner was modeled and simulated based on the turbulent model (k-epsilon). The results from simulation were validated by experimental methods. According to the results, higher swirl number flows cause more significant mixing effects. Different frequency perturbations change flow field characteristics in a certain range with reduced effects at very high and low frequencies.

Major: Mechanical Engineering / Thermo-fluids

Educational Career:
Bachelor's of Mechanical Engineering / Thermo-fluids, BS, 2004, Iran University of Science & Technology

Committee in Charge:
Dr. Saptarshi Basu, Chair, MMAE
Dr. Ranganathan Kumar, Professor / MMAE
Dr. Jayanta Kapat, Professor / MMAE

Approved for distribution by Dr. Saptarshi Basu, Committee Chair, on April 21, 2010.

The public is welcome to attend.