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Experimental and Numerical Investigation of a Flameless Oxidation Combustor

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The flow characteristics of a combustor model under non reacting conditions were investigated using LDA. Data is reported for mean and turbulent velocities as a function of the air mass flow rate. The main conclusions are as follows: i) a common feature to all test conditions is the establishment of a large recirculation zone and ii) mean and turbulent velocities increase within the recirculation zone as the air mass flow rate increases. The isothermal flow characterization was followed by combustion measurements at the exit of the combustor model. Measurements of mean gas species concentration (O2, CO2, CO, HC and NOx) are reported as a function of the equivalence ratio and thermal input. The main conclusions are as follows: i) combustion efficiency is highest (about 90%) for both low values of thermal input and equivalence ratio, ii) NOx emissions are very low over a large range of operating conditions.

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