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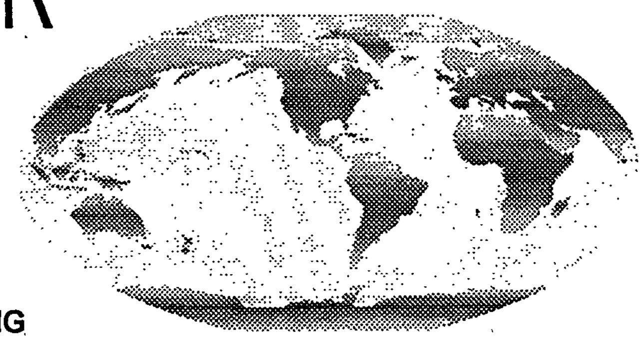

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EXPERIMENTAL INVESTIGATION OF LOW DA TURBULENT REACTION

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Although theoretical and computational models of turbulent combustion under a variety of conditions abound, only few experiments have been performed under low Damkohler numbers, for which mixing times are approximately of the same order of magnitude as chemical times. Practical applications of such reactive flows are particularly important in pollutant formation (e.g. unburned hydrocarbon oxidation and nitric oxide formation), incineration and autoignition. A new experimental facility employing the advantages of simple grid turbulence has been constructed to investigate reacting flows in which mixing rates are of the same order of magnitude as reaction rates under conditions of interest for the post flame oxidation of hydrocarbons. A turbulent grid diffusion burner was designed to operate under a wide range of temperatures (800 to 1400 K) at high dilution in order to create a flat turbulent flame. A ceramic grid serves to control the turbulence level and length scale in the post flame region, such that $Re_M = UM/\nu$ for cold flow is kept around 20 to 500, where U is the mean air velocity and M the mesh size. Isokinetic injection of a tracer or reactant species at the grid creates a mixing-reaction layer in the 50 cm long, 8.5 cm diameter test section downstream. Measurements of the spread of the mixing layer are made using a cooled probe throughout the test section. Experimental results are presented in the characterization of the cold velocity field, and the spread of reactant under cold (non-reactive) and hot (reacting) conditions.