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Cavity ringdown measurement of OH(X) in the microwave plasma-assisted ignition[1] CHUJI WANG, CHE A FUH, Mississippi State University — Cavity ringdown spectroscopy is employed to measure the absolute concentration of the ground state OH(X) radical at the ignition region in the microwave plasma-assisted combustion (PAC) of a premixed methane/air mixture. A 2.45 GHz solid state microwave source was used to generate the plasma used in this study. The PAC platform consisted of a triple-layered coaxial cylindrical quartz combustor with the argon plasma conducted in the innermost cylinder and the premixed methane/air as the coflow. This configuration allowed for the coupling of the plasma and reactants outside the combustor making the plasma-assisted ignition region accessible to the cavity ringdown beam. Optical emission spectroscopy and visual imaging were used to obtain information about the excited state species along with plasma and flame geometries, respectively. A single peak was observed in the excited state OH(A) emission profile in the hybrid zone whereas no OH(X) peak was observed in the hybrid zone. The representation of both OH(A) and OH(X) provides a complete picture of the role played by the OH radical. The results obtained further confirmed the hypothesis that OH(X) is more involved in the stabilization reactions whereas OH (A) is more prevalent in the ignition process.

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