ABSORPTION SPECTROSCOPY OF METHANOL FOR MICROGRAVITY COMBUSTION DIAGNOSTICS

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We are pursuing diode laser absorption measurements in the $2\nu_1$ band of methanol for combustion diagnostics in a microgravity environment, with applications for droplet combustion and pool fire experiments. We combine the methanol measurements with water vapor measurements made with the same instrument in order to generate spatially resolved measurements of fuel vapor, water vapor, and gas phase temperature. The technique and the selection of transition are driven by constraints of size, weight, power, and turn-key operation on board a spacecraft or in a drop tower. The role of spectroscopic diagnostics in the microgravity combustion program will be discussed. A description of the Combustion Integrated Rack facility for the International Space Station will be provided.