SUB-MILLISECOND TWO-DIMENSIONAL OH LINE PROFILES OBTAINED WITH A MHZ-RATE HIGH RESOLUTION UV LASER SOURCE

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We report on producing MHz-rate pulse burst tunable high energy UV radiation and its application to high-speed temperature measurements of combustion based on planar laser-induced fluorescence (PLIF) spectroscopy. The laser system consists of a narrowband high-speed tunable seeded OPO pumped by harmonics of a MHz-rate pulse-burst pump laser. The pump laser utilizes an AOM-based pulse slicer followed by a 5-stage Nd:YAG amplifier. The pump laser produces 4 bursts per second with a burst duration as long as 1.5 ms and total burst power up to 2 J. Each burst consists of 5 to 100 pulses with each pulse duration variable between 6 to 50 ns. The custom OPO produces up to 5 mJ per pulse in the range from 220 to 315 nm for exciting electronic transitions of species such as nitric oxide and the hydroxyl radical. The laser system performance is tested in well characterized flames and pulse-burst PLIF results are presented.