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Harmonic Generation from Common Liquid Phase Systems ANTHONY DICHIARA, EMILY SISTRUNK, TERRY MILLER, PIERRE AGOSTINI, LOU DIMAURO — Harmonic generation driven by the fundamental frequency of an intense laser field has been the subject of extensive studies in gas phase atomic and molecular systems. Exciting contributions from this diverse field of study include the production of attosecond (10E-18 s) pulses and molecular orbital tomography. Recently, there has been an interest in scaling strong field processes with wavelengths in the mid-infrared (MIR) region. An advantage is that harmonics of moderate order are transparent in air for driving fields in the MIR region. Here we present an experiment where this transparency is exploited to study the generation of harmonics from a liquid at room temperature. A wire guided fluid jet is used to create thin (100-150 microns) flowing samples of various fluids. The laser is a MIR optical parametric amplifier operating at a center wavelength of 3.6 microns with a repetition rate of 1 kHz, a peak pulse power over 700 MW and is focused to field intensities less than 10 terawatts per-square-centimeter. No evidence of supercontinuum generation is observed. Odd harmonics from samples of water, heavy water and several alcohols, including Isopropyl, are examined. For example, Isopropyl alcohol (water) generated up to the ninth (thirteenth) harmonic. For isopropyl the seventh harmonic is 130 times brighter and the overall efficiency of harmonic production is greater by two orders of magnitude as compared to water.

Anthony DiChiara

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