1-D Electric Field Measurements Using Field Induced Second Harmonic Generation

BENJAMIN GOLDBERG, STEPHAN REUTER, ARUTHER DOGARIU, Princeton University, RICHARD B. MILES, Texas A&M University — Electric field measurements are carried out in an atmospheric pressure argon plasma jet using femtosecond laser electric field induced second harmonic generation. The discharge is sustained using an ns pulse generator with peak voltage of 6 kV and FWHM 25 ns. Time resolution is 200 ps and spatial resolution is less than 1 mm along the beam propagation. Calibration of the diagnostic is done using a DC voltage applied between two electrodes in the same argon jet flow. The fs laser is focused using a cylindrical lens, and the measured signal beam is monitored on an ICCD allowing for 1-D spatial resolution. Calibration is carried out for every pixel. Electric field sensitivity is 300 V/cm at the center of the Gaussian laser sheet. Time gated ICCD imaging is also completed allowing for absolute temporal resolution based upon plasma emission. Both ICCD imaging and field measurements indicate the presence of an ionization wave. The results show that femtosecond lasers can be used for 1-D spatially resolved measurements with a high degree of temporal resolution possible.

Benjamin Goldberg
Princeton University

Date submitted: 25 Jul 2018