Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Fast Photography of Acoustic Shock Waves in Glow Discharge Plasmas[1] A.L. ROQUEMORE, Princeton Plasma Physics Laboratory, Princeton, NJ, N.K. PODDER, A.C. LOCASCIO, Troy University, Troy, AL — A fast imaging camera has been used to record the propagation dynamics of an acoustic shock wave in glow discharge plasmas at a frame rate of 43,000 fps. Measurements are performed in both N_2 and Ar discharges and for both propagation polarities, i.e, anode-to-cathode and cathode-to-anode propagations. Video frames obtained for the shock wave propagation in the N_2 plasma indicate that the plasma emissions at the nitrogen shock-front are enhanced by up to 40% over the background, whereas those in the Ar plasma indicate that the plasma emissions at the argon shock-front are suppressed. Analyses of the video frames yield the shock wave propagation velocities, which are compared with the velocities obtained from an existing laser beam deflection method. Additional comparisons between the velocities from the two methods are made for both anode-to-cathode and cathode-to-anode propagations of shock waves in plasmas. For both propagation polarities of the shock waves, the average velocity trend determined from the two methods are in good agreement.

[1]Work supported by USDOE Contracts DE-AC02-76-CH03073 and DE-FG02-04-ER54792.

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Date submitted: 20 Jul 2008 Electronic form version 1.4