Abstract Submitted
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Time-Resolved High-Spatial-Resolution Measurements of Underwater Laser Ionization and Filamentation[1] T.G. JONES, D. KAGANOVICH, M.H. HELLE, J. PENANO, A. TING, D. GORDON, Plasma Physics Div., Naval Research Laboratory — Laser triggering and guiding of underwater electrical discharges are being investigated and developed at NRL for applications including advanced micromachining and low-frequency laser acoustic generation. As part of this development we recently made several high-spatial-resolution, time-resolved measurements of underwater optical filamentation and laser ionization. Using 2-laser pump-probe backlit imaging techniques, we were able to achieve time resolution as short as 35 fs and spatial resolution down to 1 micron. Shadowgraph images show few-micron diameter gas bubbles forming throughout the pump beam path in ps timescales. Microbubble numbers and density increased with pulse energy and time during the pump pulse. We also obtained time-resolved spectra of ns-laser-ionized water, revealing black-body radiation lasting more than 100 ns after the ionizing pulse. Results from ongoing underwater laser ionization, filamentation, and discharge-guiding experiments will be presented.

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