

Abstract Submitted
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Ultra-high speed measurement of a laser-induced underwater shock wave¹ KEISUKE HAYASAKA, YOSHIYUKI TAGAWA, Tokyo Univ of Agri & Tech — We find that a laser-induced underwater shock wave has an interesting character: peak pressure varies in propagation direction while pressure impulse is the same for all directions. In general, a shock wave is often approximated as a single-spherical wave, which seems to contradict with the aforementioned character. In this research, we investigate a structure of a laser-induced underwater shock wave in order to rationalize the character. We utilize an ultra-high speed camera to visualize the shock waves and plasmas. Our measurement results reveal that the shock wave and the plasma consist of multiple spherical-shock waves and multiple plasmas. We here suggest a simple model of multiple-shock waves: a laser-induced shock wave can be interpreted as a collection of spherical shocks originated from multiple plasmas. This model explains both the different peak pressures and the same pressure impulses. In addition, we estimate shock pressure in a two-dimensioned field using non-invasive optical methods, which measure a projected density field of a shock wave.

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