Contribution ID: **784** Type: **Poster**

3P17 - Investigation on shock wave generated by underwater discharge due to different progress of plasma

Wednesday 26 June 2019 13:30 (1h 30m)

In the case of generating a shock wave by underwater discharge, there is a disadvantage that the electrode is consumed by a large current. When a thin electrode is used, dielectric breakdown tends to occur but consumption is accelerated. When a thick electrode is used, it is difficult to wear out but insulation breakdown hardly occurs and a large voltage is required. These effects are generally known for the influence on discharge by changing the electrode diameter. Progress of the plasma changes by changing the electrode diameter. We thought whether there is no influence on the shock wave generated by changing progress of changing. Pressure is the most important as application using shock waves. However, even if the rise time and energy of the shock wave change, the experimental result may be affected.

In this study, we investigate the influence on the shock wave when the electrode diameter is changed. We generated underwater discharge using pulse power generator, which is MPC (magnetic pulsed compression). The pressure of the shock wave generated by discharge depends greatly on the discharge energy. Spherical shock waves are generated from the opposing electrodes. We observe the bubble at that time. Also, reflecting spherical shock waves with parabolic reflector and outputting parallel shock wave. As a result, stronger shock waves can be generated, and measurement is facilitated. We measure pressure, rise time, and shock wave energy of shock waves at different electrode diameters. The shock wave was measured using FOPH (fiber optical probe hydrophone) and the discharge was observed by Schlieren method.

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Session Classification: Poster - Industrial/Commercial/Medical Applications and Plasma and Pulse Power Diagnostics

Track Classification: 6.2 High-Pressure and Thermal Plasma Processing