Contribution ID: **42**   Type: **Oral Presentation**

Seismic Wave Characteristic of Ground Surface Layer Produced by Pulsed Discharges in Closed Water Domain

Wednesday 6 July 2016 11:45 (15 minutes)

Pulsed discharge in water has been widely used in seismic prospecting. The spark source used in the sea or on the land has formed series of products, which is based on the pulsed discharge in expansive water domain, such as in the sea or in the deep well. But the traditional spark source is not applicable in some places short of water, especially in the mountain region. Therefore the technology of portable spark source, independent of surrounding water environment, needs to be developed. The transfer efficiency from electric energy to seismic wave energy is the most important factor in this technology. The electrode filled with water was firstly designed to develop the pulsed discharge experiment. The seismic wave generated by pulsed discharge was measured by seismic wave detector. The relation of seismic wave amplitude and discharge parameter was observed. The electrode component is machined by stainless steel and other materials which have similar acoustic impedance with salt water to enhance the transfer efficiency from electric energy to acoustic energy. The piston-like electrodes were also designed to enhance the transfer efficiency from electric energy to mechanical energy, in which some component could be active up and down due to the impulsive force produced by pulsed discharge. The seismic wave in different electrode construction was measured and analyzed. The experiment result indicates that the amplitude of seismic wave is largest in piston-like electrodes, which also indirectly indicates that the energy of pulsed discharge in closed electrode filled with water is transferred to the ground surface layer mainly by mechanical shock.

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Session Classification: Oral 1

Track Classification: Plasmas, Discharges, and Electromagnetic Phenomena