Experimental and Theoretical Studies for Seafloor Survey by Ground Penetrating Radar

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The electromagnetic wave (EM) do not propagate in the seawater because of high conductivity. In recent, the ultrasonic wave is widely used in the sea, such as the fish-finder, the side-scan sonar, and so on. We have used the ground penetrating radar (GPR) by several hundred MHz to search missing persons and rubbers in the sea after the tsunami caused by the Great East Japan earthquake. In this study, we have studied the under seawater prospecting using 350/400 MHz GPR in Hiroura Bay, Natori city, in Isohama fisher port, and off the coast of Sakamoto, Yamamoto town, Miyagi prefecture. At first, frequency characteristics of complex permittivity of several seawater samples by the time domain reflectometry (TDR), and conductivity in the depth of seawater by the conductivity temperature depth profiler (CTD) have been shown. Also, it is shown that the reflected wave from several objects at the about 10 meters depth has been observed using the 350 MHz GPR. Finally, the EM wave propagation in the seawater has been analyzed using the FDTD method with the graphics processing unit (GPU).

Keywords: ground penetrating radar, seafloor survey, FDTD

