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Obtaining Submarine Heading Using Magnetic Wake in Shallow Waters

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Abstract

In this paper, we proposed a new detection method to discover ships and submarines in shallow waters, using an airborne magnetic sensor. Detection scenario is based on vessel travelling at sea which causes geomagnetic anomalies in sea water. Derived analytical formulations showed the relation of geomagnetic anomaly with physical properties of vessel and environmental parameters, and then frequency analysis was performed and revealed that frequency contents of geomagnetic anomaly differed from noise frequency spectrum. In next step, geomagnetic anomaly due to submarine traveling in shallow water was simulated. The simulation results showed that the proposed method was noise robust. Finally, submarine heading was estimated using spectral analysis of geomagnetic anomaly. It was illustrated that the estimation error of vessel heading strongly depended on airborne sensor trajectory drift from submarine traveling direction.

Keywords: *Wake, Submarine heading, Magnetometer, Airborne, Shallow water.*