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Tue-Af-Po2.24-06 [105]: Verification of an Efficient Closed Loop Degaussing Technique for a Ferromagnetic ship

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Under the earth magnetic field, ferromagnetic equipments on a naval ship are magnetized, and accordingly they are apt to cause a local field disturbance underwater. To mitigate such magnetic field for ship's safety, modern vessels are usually equipped with a degaussing system. In order to minimize the underwater field anomaly, individual coil currents are elaborately tuned, and so there are two kinds of degaussing techniques named as open loop degaussing (OLDG) and closed loop degaussing (CLDG), respectively.
Degaussing coil currents in OLDG are optimally regulated in specific magnetic treatment facilities (MTF) off shore. Since it belongs to a passive current control system, OLDG cannot make up for magnetic property change of the hull. Therefore, OLDG inevitably requires periodic maintenance of degaussing coil currents. On the other hand, an active current control system is equipped for CLDG which itself can compensate magnetic property change of the ferromagnetic hull as well as the variation of the earth magnetic field on a ship. To achieve this, CLDG additionally needs tens of onboard magnetic sensors and their processing systems. In the conventional CLDG technique, underwater magnetic field is first predicted based on the sensor signals, and then degaussing coil currents are optimally regulated. Thus, the procedure for CLDG is somewhat complicated, and requires a relatively heavy computational workload when compared to OLDG.
To alleviate such the CLDG drawback, an efficient CLDG technique is proposed in this paper, and it is experimentally verified with a miniaturized MTF. The principle and procedure of the proposed CLDG is first explained with reference to the conventional ones. Then an elaborated model ship and experimental equipments for the down scale MTF are described. Finally, the closed loop degaussing performance is tested with a ferromagnetic model ship, which is equipped with fourteen degaussing coils and twelve onboard magnetic sensors.

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