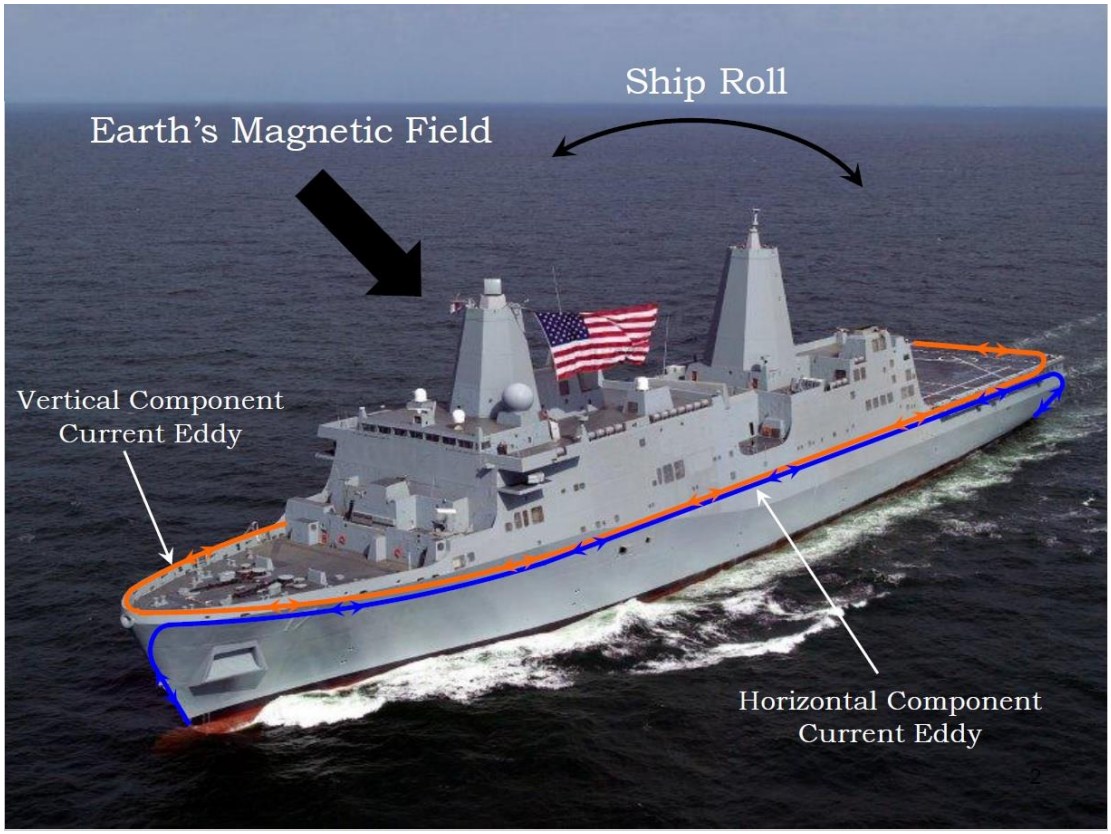
Master's project COSSE programme: eddy current modelling for geometries consisting of thin steel walls



Source: John J. Holmes – Reduction of a Ship's Magnetic Field Signatures, Morgan & Claypool, 2008

Steel ships disturb the local geomagnetic field. Through this mechanism, among other things, ships can be detected by modern sea mines that are equipped with a magnetic sensor. The magnetic disturbance field of a ship is also known as the magnetic signature. For naval vessels that must be able to operate in conflict areas, the mine threat, and therefore also the magnetic signature, is of great importance. That is why these ships have a coil system on board with which the magnetic signature can be minimized. This so-called degaussing system is a control loop: the position and orientation of the ship in the geomagnetic field are continuously monitored and with this information, the currents in the coils are controlled.

One of the contributors to the magnetic signature are eddy currents due to the ship's motion in the Earth's magnetic field. Because the ship's steel is highly conductive, electric currents are generated by the motion in the ship's hull. These in turn generate a magnetic field. This contribution to the magnetic signature is relevant to the mine threat. In order to gain insight into the strength of this effect, a Boundary Element code is developed in this assignment with which the eddy currents and the resulting magnetic field can be calculated. The calculation is simplified by using that the steel ship construction consists of thin steel plates.

For more information about this assignment, please contact:

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