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[Invited] Modelling and characterization of a ReBCO HTS degaussing demonstrator

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In this contribution the magnetic modelling and experimental validation of a superconducting degaussing system for maritime vessels is discussed. Degaussing coils compensate for the distortion in the earths'magnetic field by the magnetized steel hull of a ship, thus rendering it 'invisible'for magnetic field sensors. Whereas typical power requirements with copper coils are of the order of 100 kW, an HTS degaussing system in principle allows to reduce this by an order of magnitude. In order to validate such efficiency estimates and to demonstrate the required hardware, a table-top test set-up was realized with magnetic ship steel. The vessel imitating cylindrical demonstrator is equipped with six degaussing coils, grouped in three sets that act in two different directions, with each set consisting of one copper and one ReBCO coil, the latter one equipped with a sub-cooled liquid nitrogen system. Static and dynamic magnetic field measurements are reported and compared to both analytical and numeric finite element models. The results illustrate how even relatively simple analytical models can be used as a powerful tool to extrapolate design parameters and thus to predict the power requirements of large-scale degaussing systems.

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