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Fundamental study of a liquid hydrogen tank for transportation using MgB2 level sensor

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Hydrogen energy is attracting attention as an alternative energy source to fossil fuels and nuclear power. In the storage and transport of a huge quantity of hydrogen on the sea, liquid hydrogen (LH2) is very effective because its density is about 788 times that of gaseous hydrogen (273 K, 1 atm). We are currently developing an external-heating-type superconducting magnesium diboride (MgB2) level sensor for a liquid hydrogen tank. Our purpose in this study is to elucidate sloshing phenomenon in the LH2 tank during transportation by truck and ship using MgB2 level sensor because of the good response. As a preliminary test to clarify the sloshing phenomenon in the LH2 tank, synchronous measurements of liquid level, temperature, pressure and acceleration inside the tank were successfully carried out on board of the training ship. Experimental results including sloshing phenomenon by means of simultaneous measurements using several MgB2 level sensors are reported.

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