Research on the dynamic performance of ship isolator systems that use magnetorheological dampers(PDF)

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Title: Research on the dynamic performance of ship isolator systems that use magnetorheological dampers

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摘要: Isolator systems on ships should ideally be able to simultaneously reduce low frequency vibration response and high frequency shock response. Conventional isolator systems are unable to do so. To solve the problem, a new style isolator system was created. This isolator system consists of a steel coil spring component and a magnetorheological (MR) damper component working in parallel. Experiments on this isolator system were carried out, including tests of vibration reduction and shock resistance. The vibration load frequencies were set from 1-15 Hz, and force amplitudes from 2.94~11.76 kN. The maximum shock input acceleration was 20 g, and impulse width was 10ms. Both the vibration and shock loads were applied using MTS Systems Corporation’s hydraulic actuators. The experimental results indicated that the isolator system performs well on system vibration response, with resonance humps of the vibration response obviously reduced after using the MR damper. For the shock experiment, the attenuation of shock response was much faster with increased MR damping. The MR damper’s effect on shock moments was very different from its performance in vibration mode. The correlation between MR force and control current was not as evident as it was during vibration loads.

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