스트레인 게이지법을 이용한 선박의 NCR 운전중 전타조건이 추진축계에 미치는 영향 연구

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A study on the rudder turn effect during NCR which affects on the propulsion shafting system using strain gauge method

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핵심용어 : 선박 전타, 프로펠러 추력, 유체 유도 불안정, 불평형 진동
Key Words : *Rudder turn, Propeller forces, Fluid induced instability, Imbalanced vibration*

The ship's dynamic condition is generally related to the torsional vibration specified in the Rules of the Society, and intermittent lateral and longitudinal vibrations have been studied. However, the influence of the propeller thrust on the ship propulsion shafts has not been applied to all ship types at all, so it has been emphasized through previous studies, It is important to provide a foundation for conducting analysis. Therefore, in this study, the effect of propeller eccentric thrust on the propeller shaft was examined for a 4700 DWT tonnage class training ship.

The test conditions of the subject ship were set according to the SOLAS II-1, Article 29 (3) (within 35 seconds from one side to 30° from other side within 28 seconds). However, the purpose of this test is not to verify the capability of the rudder, but to investigate the effect of transient conditions due to wakefield changes at the rear of the ship on the ship propulsion system (35°) on one side, and the test condition was set until the course of the ship was changed by 90 ° in the forward direction. In addition, the speed of ship was limited to the vicinity of NCR in consideration of vessel condition, marine condition, and ship 's sensitivity. The effect of propeller eccentric thrust on the axial behavior was investigated in the starboard condition as described above, and the following results were obtained as follow;

(1) In the NCR state, it is found that the typical operating mode is shown at the free end, and it is confirmed that the transient state at the turning is the main factor affecting the shaft behavior by inducing the propeller eccentric thrust.

(2) It was confirmed that the fluid induction instability state and the stall phenomenon appear when the flow becomes unstable in the stern tube before starboard turn.

(3) The propeller eccentric thrust when starboard turn proved that it contributes to the stern tube bearing load relief by acting as a force to lift the shaft relative to the NCR from the stern tube bearing.

Considering that this phenomenon has not been taken into account during shaft alignment so far, further studies will need to consider the imbalanced vibration caused by the eccentric thrust that changes in transient state.

Acknowledgement

This work was supported by the National Research Foundation of Korea(NRF) grant funded by the Korea government(MSIT) (No. NRF-2017R1C1B5017114).

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