KRISO 선박해양플랜트연구소

연구실적물 블라인드 처리 가이드라인

선박해양플랜트연구소 공개채용은「평등한 기회, 공정한 과정을 위한 공공 기관 블라인드 채용 가이드라인」을 따르고 있습니다. 이에 응시원서 작성 시 첨부하는 연구실적물(논문, 특허) 증빙자료의 블라인드 처리 기준에 대해 다음과 같이 안내드리며, 반드시 유의사항을 숙지하시어 전형과정에서 불이익을 받지 않도록 유의하시기 바랍니다.

1. 논문 실적(학위논문 초록 포함)의 블라인드 처리 가이드(2페이지 샘플 참고)

구 분	내 용
블라인드 처리 항목	1. 저자 소속 등 인적사항 - 지원자 본인뿐만 아니라 모든 저자의 소속, 이메일 - 교신저자 등 별도로 기재된 소속, 연락처, 이메일 - 저널에 따라 페이지 상/하단에 기재된 저자정보(인적사항, 성명 등) 2. 사사문구(Acknowledgments) 3. 학위논문 내 학교 워터마크(watermark) 4. 첨부파일 명칭은 게재논문(1), 게재논문(2)와 같이 변경 - 첨부파일 명칭에 이름 등의 개인정보를 포함하지 않도록 유의
블라인드 미처리 항목	1. 저널명, 논문명, 주요 Article info(게재권호, ISSN 등)

2. 특허 실적의 블라인드 처리 가이드(5페이지 샘플 참고)

구 분	내 용
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블라인드 미처리 항목	1. 특허번호, 등록일자 및 발명의 명칭 등 특허 기본정보

3. 기타 서류 블라인드 처리 가이드

- (공통) 직무능력기술서, 자기소개서, 학술 활동(저서 및 역서 등), 학회 활동, 연구참여 실적 등 증빙서류 제출시 본인이름을 제외한 인적사항(저자명, 학교명, 연락처, 이메일) 등을 가리거나 삭제 후 제출
- (석·박사) Essay, PPT 제출시 본인이름을 제외한 인적사항(저자명, 학교명, 연락처, 이메일) 등을 가리거나 삭제 후 제출

블라인드 처리 샘플(논문)

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Experimental investigation on turning characteristics of KVLCC2 tanker in regular waves

제 1저자[a,*], [redacted][a], [redacted][b], [redacted][a], [redacted][a]

[redacted]

저자이름 : 블라인드처리
- 저자가 몇 명인지 알수 있도록 이름별 블라인드 처리
- 본인이 몇번째 저자인지 표시
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저자 소속: 블라인드 처리

A R T I C L E I N F O

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Speed loss
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Drifting distance
Drifting angle

A B S T R A C T

Manoeuvring performance of a ship in actual sea is significantly different from that in calm water due to wave loads. It is necessary to estimate the ship's manoeuvrabilities in waves at the early design stage for its safe operations. Several theoretical approaches have been attempted to estimate the manoeuvring performance of ships with considerations of wave loads in recent decades, but there are insufficient model test data for the validation of numerical results. In this study, free-running model tests are systematically performed for well-known KVLCC2 tanker. Model tests are carried out in a square basin, regular waves are generated with the variations of directions, lengths, and heights. In particular the wave lengths are selected at around the ship length. The number of propeller revolution is determined for the model speed corresponded to full-scale service speed in calm water, that rps is fixed in all runs. Therefore the loss of approach speed is observed depending on the encountered wave conditions. Encountered wave profiles are estimated by using relative wave heights data measured on the side of deck in real time, the rudder is always deflected at the moments when the wave crest passes on the midship of the model. The timing of rudder deflection has little influence on the low frequency manoeuvring motions of the model ship. Drifting distances of turning trajectories are relatively large when the wave lengths are below the ship length, and relative drifting angles between wave propagation direction and trajectory drifting direction are largest when the wave lengths equal to the ship length. Drifting distances and relative drifting angles increase with increasing wave heights. Although the trajectories at the early stage of turns are varied depending on encountered waves, drifting distance and angles during steady turns are similar if the wave height and length are identical. Based on the present test results, it is appropriate that the trajectory drifting distances and angles are defined as the magnitude and direction of a vector between two positions with the headings of 360° and 720°. Finally, the effects of velocity fluctuations on the trajectory drifts are analyzed in some cases.

1. Introduction

In general, manoeuvring performance of a ship is evaluated in calm water. However the ship encounters wave forces and moments in a seaway, its performance in waves are significantly different from the calm water performance. Compared with calm water manoeuvres, the ship speeds are changed, additional ship motions are generated, even the ship trajectories may be drifted in waves. So it is necessary to estimate the ship's manoeuvrabilities in waves at the early design stage for the safe operations in actual sea. Integrated analyses on various hydrodynamic performance such as resistance, propulsion, and seakeeping as well as manoeuvring performance are required for the accurate estimation of ship performance in waves.

There are some previous researches about the ship manoeuvrabilities in waves by mainly experimental techniques. Hirano et al. (1980) carried out turning circle tests of self-propelled roll-on/roll-off model ship in regular waves, and manoeuvring simulations with considerations of wave drift forces were attempted. Ueno et al. (2003) performed manoeuvring tests of a VLCC model ship in regular waves, drifting distances of turning trajectories are defined by successive positions with wave encounter angle of −90°. Yasukawa (2006, 2008) performed turning, zig-zag and stopping model tests of SR108 container ship in waves, and simulation results were compared with the model test results. Yasukawa and Nakayama (2009) carried out two-time scale simulations composed of high-frequency 6-DoF wave-induced motions and low-frequency 4-DoF (surge, sway, roll and yaw) manoeuvring motions, and free-running model tests for S175 container ship were also performed to verify the simulation results. Yasukawa et al. (2015) conducted free-running turning and zig-zag tests in irregular waves and 3-DoF practical manoeuvring simulations including wave drift force

[redacted]

저자 이름, 저자 관련 정보(이메일, 연락처 등) : 블라인드 처리

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[redacted] 저자 이름 : 블라인드 처리

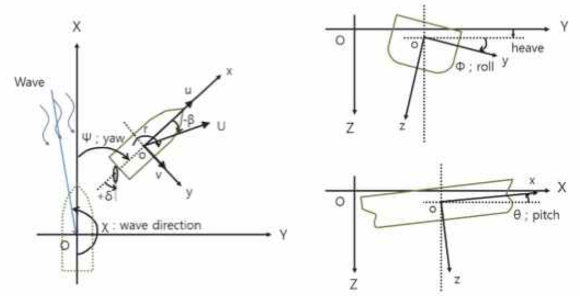

Fig. 3. Coordinates system.

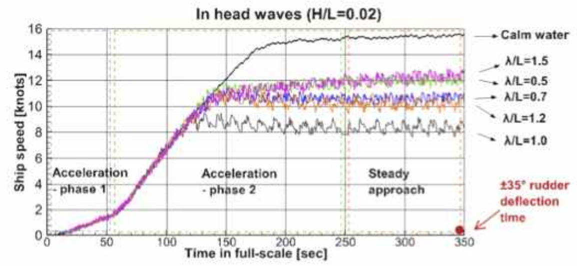

Fig. 4. Ship speeds at acceleration and steady approach phases.

short and long ends, and wave absorption beaches are located on opposite sides, which minimize wave reflections. Wave calibrations are performed at nine points which mostly cover all the tested area. According to the wave calibration results, wave lengths and heights at all points are within errors of 0.2% and 2.0%, respectively. It is confirmed that the effects of reflected waves on model ship trajectories are negligible.

Referring to the experimental system by Matsuda et al. (2016), two total stations are used in order to measure the model ship positions and headings. The slope distance, horizontal angle, and vertical angle of the target prisms on the model ship are measured with the sampling rates of 20 Hz, 3-dimensional positions of the model ship can be obtained by using measured data. One prism is fixed on the intersection point of midship and centerline, and the other is fixed on the intersection of station 18 and centerline. The height of all prisms is 0.308 m upwards from the draft of model ship. Model ship trajectories are obtained by using positions of the prism at the midship. Model ship speed is calculated by differentiating the positions with time as well. Self-propulsion and steering systems, motion measuring devices such as gyro, inclinometer, onboard PC, batteries, and wireless modem are mounted on the model ship. All synchronized signals are transmitted to the ground control PC wirelessly, they are controlled and monitored in real time (Yun et al., 2015). In addition, several ultrasonic wave probes are installed on the side of the model ship deck. Relative wave height data are used to estimate the encounter wave elevations (Kim et al., 2018a and 2018b).

2.3. Test scenarios

The coordinates system used in present study consists of earth fixed (O-XYZ) and body fixed (o-xyz) coordinates as shown in Fig. 3. 35° starboard and port turning circle tests are performed in regular waves. Most of the tests are carried out in regular waves with the directions of 180° and 270°, which mean head and port beam waves, respectively. The wave lengths are varied from 0.5 L to 1.5 L. And waves are generated with the directions of 150° and 240° in some cases of 35 starboard turns. Wave heights are mostly fixed as 2 percent of ship length. And for 35° port turns in head waves with the wave length of 1.0 L, the wave heights are varied from 1 to 2 percent of ship length. Total test scenarios are shown in Table 2.

Table 2
Conditions of turning circle tests in calm water and in regular waves.

Rudder angle, δ	Wave direction, χ	Wave height, H	Wave length, λ	Propeller RPS
[degree]	[degree]	[L]	[L]	
+35, −35	No waves (in calm water)			17.5
+35, −35	180, 270	0.02	0.5, 0.7, 1.0, 1.2, 1.5	
+35	150, 240	0.02	1.0	
−35	180	0.01, 0.015, 0.02	1.0	

Table 3
Rudder autopilot control gains for straight-course acceleration and steady approach.

Condition	P gain [°/°]	D gain [sec]
Tests in calm water	0.5	1.5
Tests in head waves	0.8	0.4
Tests in beam waves	1.5	0.4

Model ship speed corresponding to the full-scale service speed, 15.5 knots in calm water is 0.797 m/sec. The number of revolutions of model propeller is 17.5 RPS. Propeller RPS is fixed as 17.5 RPS in all runs. Rudder rate of the model ship is 23.4°/second which is corresponding to 2.34°/second in the full-scale.

3. Approaching conditions

3.1. Acceleration and steady approach

At the beginning of the model tests, the model ship is straightly accelerated with autopilot controls, and maintain the constant approach speeds. Fig. 4 shows the time histories of ship speeds at three phases of accelerations and steady approach in head waves. Phase 1 acceleration, phase 2 acceleration, and steady approach take around 5, 20, and 10 s in model scale, and corresponding model propeller RPS are 16, 30, and 17.5 RPS, respectively. Total approaching distance of the model ship is approximately 20 m, which is minimized in order to use tested area as large as possible.

PD controls are used to keep the straight course of the model ship during accelerations and steady approach. In other words, rudder angles are controlled in proportion to heading angles and yaw rates of the model ship. Three kinds of P and D gains are used for calm water, head wave, and beam wave tests. All gains are represented in Table 3.

Although the calm water speed of model ship is 0.797 m/sec corresponded to model propulsion point, 17.5 RPS, the speed is decreased in waves due to the added resistance of the model ship. Fig. 5 shows the full-scale approach speeds in regular head waves. In particular, when the wave height is 0.02 L and the wave length is 1.0 L, the approach

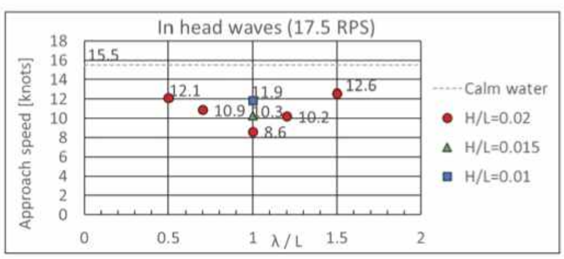

Fig. 5. Approach speeds in regular head waves.

[redacted] 저자 이름 : 블라인드 처리

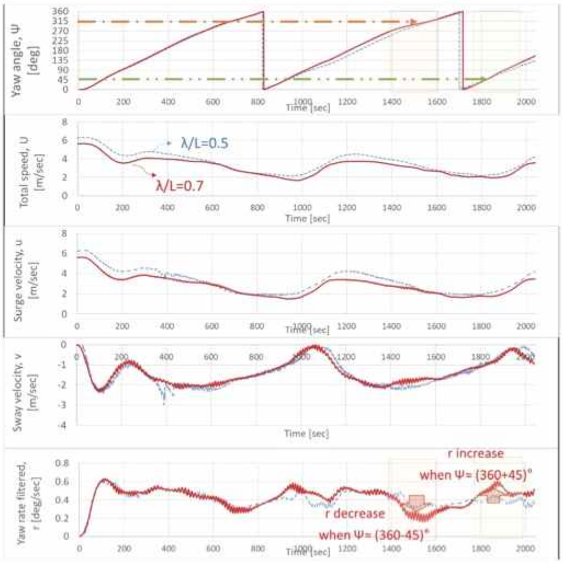

Fig. 25. Turning histories '$\lambda/L = 0.7$' case (large relative drifting angle), compared with '$\lambda/L = 0.5$' case (small relative drifting angle).

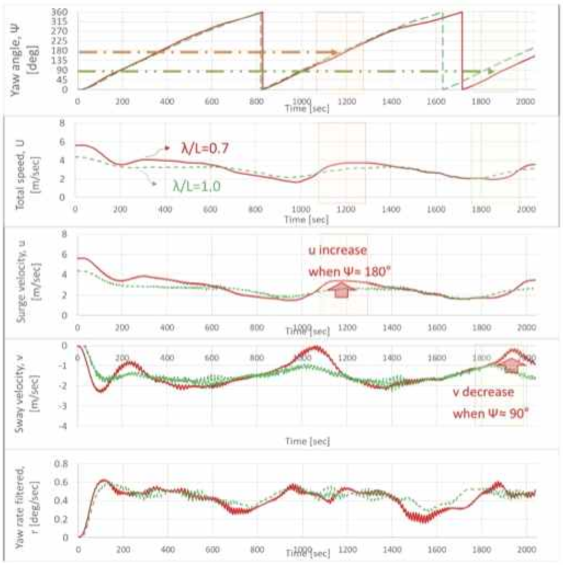

Fig. 26. Turning histories '$\lambda/L = 0.7$' case (long drifting distance), compared with '$\lambda/L = 1.0$' case (short drifting distance).

largest when the wave lengths equal to the ship length,

- Drifting distances and angles increase with increasing wave heights due to increasing wave drift force and moments.
- Drifting distance and angle are defined by using the magnitude and direction of a vector between two ship positions with the headings of 360° and 720°.
- Drifting distances and angles are affected by the fluctuations of velocity components. Relative drifting angles are increased with large perturbation of yaw rates, and the trajectories are mainly drifted with the fluctuated surge and sway velocities.

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[redacted]

저자 이름, 저자 관련 정보(이메일, 연락처 등) : 블라인드 처리

블라인드 처리 샘플(특허)

(19) 대한민국특허청(KR)
(12) 등록특허공보(B1)

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(73) 특허권자
지원자, 총 2명 [redacted]
(72) 발명자
지원자, 발명자 총 10명 [redacted]
(뒷면에 계속)
(74) 대리인
김정수

특허권자, 발명자 : 블라인드 처리
- 본인이 어디에 속해 있는지 "지원자" 로 표기
- 특허권자, 발명자가 몇 명인지 알수 있도록 표기

전체 청구항 수 : 총 8 항 심사관 : 홍기정

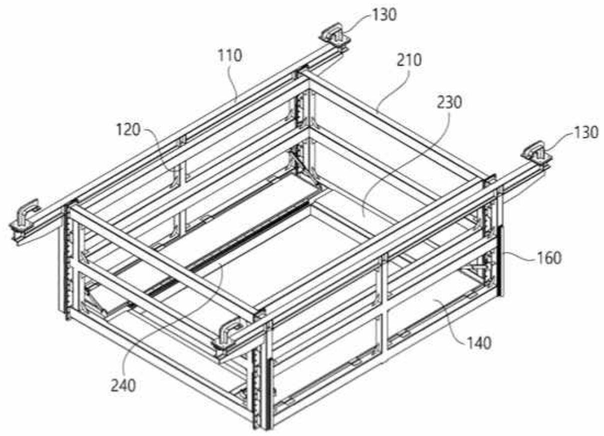
(54) 발명의 명칭 **계류 모사 장치의 거치구조물 및 이를 이용한 계류성능평가 시스템**

(57) 요 약

본 발명에 따른 계류 모사 장치의 거치구조물은 가로부재와 세로부재로 구성된 한 쌍의 작용점지지프레임 및 작용점지지프레임의 내측에 착탈가능하게 결합되며 제1 바와 제2 바로 구성된 거치프레임을 포함하고, 작용점지지프레임은, 가로부재의 상단에 구비된 상단결합구와 하부에 구비된 하부플레이트를 포함하고, 거치프레임은, 하부플레이트와 일측이 연결될 수 있도록 한 쌍의 크로스플레이트가 구비되고 한 쌍의 크로스플레이트를 연결하는 크로스바가 구비된다.

위와 같은 구성을 갖는 본 발명의 일실시예에 따르면, 기존의 예인전차와 호환되며 빙해역 해양구조물의 계류시험시 각 구간별로 계류시험이 용이하다.

대 표 도 - 도1



(72) 발명자

[redacted]

발명자 : 블라인드 처리

이 발명을 지원한 국가연구개발사업

과제고유번호
부처명
연구관리전문기[redacted]
연구사업명
연구과제명
기 여 율
주관기관
연구기간

국가연구개발사업 : 블라인드 처리

이 발명을 지원한 국가연구개발사업

과제고유번호
부처명
연구관리전문기[redacted]
연구사업명
연구과제명
[redacted]
기 여 율
주관기관
연구기간