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INVESTIGATION OF SLOSHING IN THE PRISMATIC TANK WITH VERTICAL AND T-SHAPE BAFFLES

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Abstract

The demand for liquid carriers, such as liquefied natural gas (LNG), has increased in recent years. One of the most common types of LNG carriers is the membrane type, which is often built by a shipyard with a prismatic tank shape. This carrier is commonly known for its effective ways to mitigate sloshing using a baffle. Therefore, this study was performed to evaluate sloshing in a prismatic tank using vertical and T-shape baffles. The sloshing was conducted with 25% and 50% filling ratios because it deals with the nonlinear free-surface flow. Furthermore, the smoothed particle hydrodynamics (SPH) was used to overcome sloshing with ratio of a baffle and water depth is 0.9. A comparison was made for the dynamic pressure with the experiment. The results show that SPH has an acceptable accuracy for dynamic and hydrostatic pressures. Baffle installation significantly decreases the wave height, dynamic pressure and hydrodynamic force.

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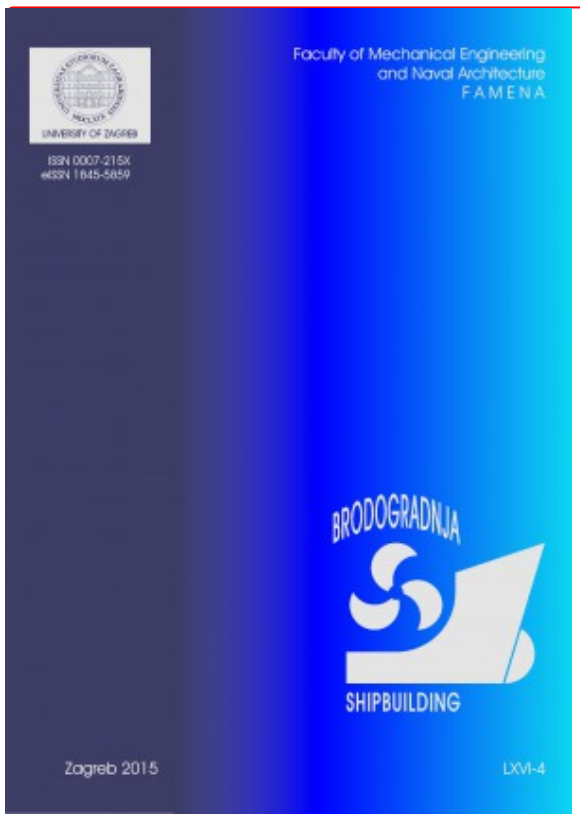

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Časopis je posvećen multidisciplinarnim istraživanjima u područjima teoretske i eksperimentalne brodogradnje i oceanologije kao i izazovnim problemima pomorstva, gradnje broda, pomorskim tehnologijama i industrijskim pitanjima diljem svijeta. Cilj je časopisa integrirati interese u brodogradnji, pomorskom inženjerstvu, pomorstvu, unutarnjoj plovidbi, intermodalnom transportu kao izaštiti okoliša, sveukupnoj sigurnosti, hidrokinetičkim obnovljivim izvorima energije vjetra i valova i održivom razvoju prometa na morima i oceanima. Časopis je usredotočen na hidrodinamiku, konstrukciju, pouzdanost, materijale,projektiranje, optimizaciju, gradnju, vođenje projekata, popravke i planiranje održavanja, nformacijske sustave u brodogradilištima, osiguranje kvalitete kao i opremanju, pogonu, pogonskim uređajima i opremi na brodovima.

Recenzija: vanjske recenzije, podjednako tuzemna i inozemna, samo znanstveni i stručni radovi, jednostruko slijepa, dvostruka

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PROCEDURE FOR RECONSTRUCTION OF GAJETA HULL FORM USING PHOTOGRAMMETRIC MEASUREMENT METHOD

(str. 139-151)

Boris Ljubenkov, Branko Blagojević, Josip Bašić, Martina Bašić

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INVESTIGATION OF SLOSHING IN THE PRISMATIC TANK WITH VERTICAL AND T-SHAPE BAFFLES

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Sažetak

The demand for liquid carriers, such as liquefied natural gas (LNG), has increased in recent years. One of the most common types of LNG carriers is the membrane type, which is often built by a shipyard with a prismatic tank shape. This carrier is commonly known for its effective ways to mitigate sloshing using a baffle. Therefore, this study was performed to evaluate sloshing in a prismatic tank using vertical and T-shape baffles. The sloshing was conducted with 25% and 50% filling ratios because it deals with the nonlinear free-surface flow. Furthermore, the smoothed particle hydrodynamics (SPH) was used to overcome sloshing with ratio of a baffle and water depth is 0.9. A comparison was made for the dynamic pressure with the experiment. The results show that SPH has an acceptable accuracy for dynamic and hydrostatic pressures. Baffle installation significantly decreases the wave height, dynamic pressure and hydrodynamic force.

Ključne riječi

Smoothed particle hydrodynamics, Sloshing, Vertical baffle, T-shape baffle, Dynamic Pressure, Wave height, Hydrodynamic force

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RESEARCH ON THE MOTION RESPONSE OF AQUACULTURE SHIP AND TANK SLOSHING UNDER ROLLING RESONANCE

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Sažetak

The double-row and double-chamfered aquaculture tank is a special tank structure of the aquaculture ship. The tank sloshing of this structure is coupled with the hull motion, which has an important impact on the safety of the hull motion. In the present study, research on the tank sloshing and hull motion response of aquaculture ships was conducted based on the model seakeeping and tank sloshing tests in regular waves. The test results were compared with the numerical simulation results of solid loading without sloshing. The results showed that the numerical simulation of the pitch motion was consistent with the amplitude-frequency response curve of the experimental results. Under certain transverse wave conditions, a large discrepancy existed between the amplitude-frequency response curve of the heave motion by the numerical simulation and the test results, and the roll motion differed most from the experimental result. Severe roll resonance occurred when the wave length-ship length ratio was 0.6. The roll motion amplitude was increased by 183.2%. Therefore, compared with aquaculture ships without sloshing, the sloshing of the tank has little effect on the pitch but has a great impact on the roll and heave motions, with the most significant effect on the roll motion.

Ključne riječi

Aquaculture ships, Tank sloshing, Ship motion, Roll resonance

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NUMERICAL PREDICTION OF SCALE EFFECTS ON THE PROPULSION PERFORMANCE OF JOUBERT BB2 SUBMARINE

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Puni tekst: engleski pdf 2.152 Kb str. 17-42 preuzimanja: **515** citiraj

Sažetak

The motivation of this study is to present the scale effects on the propulsion performance of Joubert BB2 submarine with MARIN7371R propeller. Joubert BB2 submarine was designed as a realistic attack submarine to be used in benchmarking studies. Numerical analyses were conducted solving RANS equations. The propeller in the self-propelled case was modeled using the body force method. The numerical method was verified both for submarine and open water propeller cases. The resistance, open water propeller and propulsion characteristics were validated with the available numerical/experimental data. After, the results were extrapolated to the full-scale and compared with other studies. Full-scale RANS analyses were then conducted to calculate the resistance and propulsion parameters by eliminating the possible scale effects. The extrapolated full-scale results were compared with the full-scale analyses and self-propulsion method (SPE) results. The scale effects on the resistance and propulsion parameters were obtained in detail. 1978 ITTC prediction method coupled with the body force method was utilized to observe the scale effects. In addition to this, the practicality of the SPE method for the estimation of the propulsive performance was shown. The scale effects on the propulsive parameters such as nominal wake and thrust deduction factors, open water propeller efficiency and propulsion efficiency were seen.

Ključne riječi

Body force, CFD, Joubert BB2, MARIN 7371R, Self-propulsion

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WAKE WASH OF A FAST SMALL BOAT IN RESTRICTED WATERS: MODEL TESTS AND FULL-SCALE MEASUREMENTS

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Sažetak

This paper presents the model testing of an 8.23m boat with hard chine planning hull generated waves at the Kilim recreational park. Wake is considered one of the main causes of riverbank erosion due to the energy carried by waves hitting the riverbank. Initially, ship particulars were measured from actual boats to generate a hull form using MAXSURF software. A lines plan was then generated to fabricate the model using fibreglass. Experiments were conducted in the National Hydraulic Research Institute of Malaysia (NAHRIM) at various speeds at a constant operating draft. The wave patterns generated by the modelled boats at different speeds were recorded for analysis. Wave attenuation for deep water conditions was studied and it was found that the wave exponent, n ranged from -0.36 to -0.75 for all depth Froude number (Fnh) condition. Wave decay analysis was used to estimate wave height for defined water depth. For 11 people with an average mass of 65 kg on board, the produced wave height was greater than the permissible wave wake height of 75 mm. The generated energy exceeded 60 Joules/m for nearly all measured speeds. A boat speed of less than 5 knots was suggested for boats loaded with the maximum passenger limit of 11 people. Other recommendations were made to minimize the wave wake height produced by the modelled boat.

Ključne riječi

Boat generated waves, Boat Wake Analysis, Wave attenuation, Wave energy

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