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УДК 629.5.012

DEPENDENCES FOR DETERMINATION OF MEGAYACHTS MAIN DIMENSIONS IN THE INITIAL APPROXIMATION

Tokarieva O.V.[1], Labartkava Al.V.[2]

[1]Research Assistant, Admiral Makarov National University of Shipbuilding, Mykolaiv, Ukraine

[2]PhD, Associate Professor, Admiral Makarov National University of Shipbuilding

Mykolaiv, Ukraine

olga.tokareva@nuos.edu.ua

On the basis of the statistical data analysis the architectural features and the ratio of the main sizes for megayachts are determined that allows to carry out estimation calculations of characteristics of the project at initial design stage.

Keywords: megayacht, interior, exterior, yacht building. displacement, deadweight, draft, relative length, Froude number.

Appearance of new types of ships created difficulties in their design because of lack of theoretical developments. One of such rather new type are megayachts – yachts with a length of more than 24 m [1].

Analysis of sources about megayachts has shown the difference in data range and completeness. For some yachts the deadweight structure is described in details but without information about total tonnage. For others the tonnage is give, but the deadweight components are not described, which doesn't allow to obtain the mass equation directly. The speed data in many cases contain an element of uncertainty because some sources show the speed but don't indicate the displacement of the yacht and the actual engine power was installed.

Nowadays megayachts are high-tech vessels with modern equipment. Nevertheless, this type of ship has problems typical for yacht construction [2].

The first difficulty is the lack of generally accepted criteria for evaluating the yacht. The second difficulty is the absence in domestic and foreign literature of scientific publications containing the instructions on choice of the megayachts main sizes [3, p. 61]. That's why the task of developing methodology of designing for this type of yachts is actual.

The start data for determining the of megayachts characteristics are speed, length, number of passengers, purpose, type, etc. Then, using statistics, you can determine the ratio between the main sizes of the yacht, the components of the mass load, assess navigability, comfort and safety level.

During determination the main dimensions of megayachts more attention should be paid to the volume equation [3, p. 63]. Processing of statistical data gives the possiblity to obtain dependences for

the preliminary determination of the megayachts' main characteristics. The dependences of the tonnage of megayachts D on the length L, width B and draft T are shown as an example [3, p. 63.64]:

$$D = 0{,}0016L^{3{,}33};\ D = 36{,}46B^2 - 433{,}83 + 1350;\ D = 17{,}94T^{3{,}26}.$$

Magayachts data analysis [3, p. 63] shows that they are characterized by the ratio: the main dimensions – L/D = 4,77…5,6, B/T = 2,76…3,91; relative length – $l = L/V^{1/3}$, l = 5,69…6,68, where V – volumetric displacement; Froude's number – $Fr = {}^{v}/_{\sqrt{gL}}$, $Fr = 0{,}24 \ldots 0{,}38$, where v – ship speed.

The dependences for determination of the main dimensions in the initial approximation, obtained by statistical analysis, give the ability to make estimation of the future project.

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RESEARCH ON EQUIPMENT FAILURE PREDICTION AND MANAGEMENT SYSTEM DEVELOPMENT FOR INTELLIGENT SHIPS

Wang Yibing[1], Zhan Yiting[2]

[1] professor of marine navigation of Zhejiang International Maritime College, Zhejiang Zhoushan, 316021, China

[2] Lecturer of intelligent ship design and building of College of Ocean Science and Engineering, Shanghai Maritime University, Shanghai, 201306, China

Abstract: In the era of big data, facing the intelligent ship needs, the paper works to solve intelligent maintenance and failure prediction of ship equipment. This paper intends to analyze and predict failure occurrence by 1-year continuous large-amount data collection from 1800 signal points set on the main devices of a ship to evaluate and diagnose the equipment in the operation and maintenance of intelligent ships, find out the trend of equipment decline in time and forecast the failure in advance, and reduce the uncertainties brought by equipment failures in ship operations and maintenance. Finally, it realizes ship-shore integration by intelligent ship operations and maintenance, build intelligent ships with independent learning and maintenance abilities.

Keywords: Ship Operation and Maintenance; Intelligent Ship; Big Data; Failure Prediction

Introduction.

In the past, ship operation and maintenance research usually adopted the traditional equipment failure judgment method based on equipment design and maintenance knowledge and analysis and decision making by observation and design algorithm. With the development and application of intelligent technology and big data analysis, the research based on equipment design manual, operation and maintenance big data as the center, analysis algorithm as the means, and intelligent data analysis and decision making as the demand has become more and more important, and equipment failure analysis and prediction based on big data is gradually adopted widely in the field of ships. The characteristic of big data analysis is that when the amount of data is large enough, the close relationship between data can be found directly based on the data itself, and the feasibility of big data application in ship equipment monitoring and failure prediction can be analyzed by algorithms. Tang Gaigai et al. applied an expert diagnostic model of fuzzy neural network for shore-based ship power plant failure