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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 41890.1-2022

Ships and marine technology - Model test method for propeller cavitation noise evaluation in ship design - Part 1: Source level estimation

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foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part 1.Structure and Drafting Rules of Standardization Documents"

drafted.

This document is the first part of GB/T 41890 "Model Test Method for Propeller Cavitation Noise During Design of Ships and Offshore Technology Ships"

part. GB/T 41890 has released the following parts.

--- Part 1.Sound source level assessment.

This document is revised and adopted ISO 20233-1.2018 "Model test of propeller cavitation noise in the design process of ships and marine technology ships"

Methods Part 1.Sound Source Level Assessment."

Compared with ISO 20233-1.2018, this document has made the following structural adjustments.

---Set the suspension segment in 4.1 to 4.1.1; 4.1.2~4.1.4 correspond to 4.1.1~4.1.3 in ISO 20233-1.2018;

---4.1.4.1~4.1.4.4 correspond to paragraph 4.1.3 in ISO 20233-1.2018;

---5.2.1.1~5.2.1.5 correspond to 5.2.2~5.2.6 in ISO 20233-1.2018;

--- Set the suspension section in Chapter 7 to 7.1; 7.2~7.7 correspond to 7.1~7.6 in ISO 20233-1.2018.

The technical differences between this document and ISO 20233-1.2018 and their reasons are as follows.

--- Added the definition formula of cavitation number (see 3.3), the cavitation number defined by the new formula reflects the physics of Mach number related to noise

measurement

concept;

--- Changed the value range of the Reynolds number (see 4.1.4.1) to ensure the reliability and stability of the test measurement results;

--- Changed the ship model accuracy requirements, ship model draft requirements and installation error requirements (4.1.4.3) for large circulating water tanks to improve cavitation noise

measurement accuracy;

--- Added calibration method (see 4.3) to enhance test operability;

--- Change the resolution requirements (see 5.2.3) to improve the measurement accuracy of cavitation noise;

--- Change the acquisition time requirements (see 5.2.6), which is consistent with the actual situation of domestic simulation tests;

--- Change the background noise measurement timing requirements (see 6.2) to control the reliability and stability of the measurement system and test process;

--- Added real-scale noise prediction annotations (see 7.6) to fully consider the influencing factors of real-scale propeller cavitation noise prediction.

The following editorial changes have been made to this document.

--- Change the term "reference distance" to the note of the term "source level" (see 3.7) to meet the requirements of Chinese standards;

--- Change the term "propeller disk" to the note of the term "wake" (see 3.9) to meet the requirements for the preparation of Chinese standards;

--- Change the term "propeller thrust coefficient" to the note of the clause (see 4.2), in order to meet the requirements for the preparation of Chinese standards;

--- Change the term "propeller torque coefficient" to the note of the article (see 4.2) to meet the requirements for the preparation of Chinese standards.

Please note that some content of this document may be patented. The issuing agency of this document assumes no responsibility for identifying patents.

This document is under the jurisdiction of the National Marine Machinery Standardization Technical Committee (SAC/TC137).

This document is drafted by. China Shipbuilding Industry Research Institute of Comprehensive Technology and Economics, China State Shipbuilding Corporation, China Shipbuilding Research Institute

center.

Introduction

In order to reduce ship noise level, it is necessary to understand the characteristics of ship noise. For example, propeller noise is the main noise source of commercial ships.

It is due to its spectral harmonics and cavitation to form broadband spectral noise. Special ships such as fishery survey ships and military ships require quietness.

It produces weak or no cavitation in its operating state.

Propeller cavitation noise can be evaluated by experimental/numerical methods at the propeller design stage. such as numerical methods CFD or empirical

The formula is a better way of evaluating propeller cavitation noise. However, the model test is still widely used for the cavitation noise analysis of real ship propellers in a wide frequency range.

Evaluate.

GB/T 41890 aims to provide a standardized model test method for the evaluation of propeller cavitation noise.

The cavitation noise characteristics of the scheme are properly evaluated, and it is proposed to consist of the following parts.

--- Part 1.Sound source level assessment. The purpose of the model test is to describe the sound source level assessment of propeller cavitation noise in the ship design process.

The test method is suitable for the sound source level assessment of propeller cavitation noise in the ship design process.

--- Part 2.Noise source localization. The purpose is to describe the model test method for the location of propeller cavitation noise sources in the ship design process.

The method is suitable for the noise source location of propeller cavitation noise in the ship design process.

Ships and Offshore Technology Ship Design Process

Model test method for propeller cavitation noise

Part 1.Sound source level assessment

1 Scope

This document describes a model test method for sound source level assessment of propeller cavitation noise during ship design.

The experimental process includes simulation of noise sources, noise measurement, data post-processing and real-scale forecasting. The target noise source for this test is the propeller

Cavitation noise. Therefore, this document details the simulation of ship propeller cavitation noise characteristics based on similar principles between model and real ships.

test preparation and conditions. The propeller noise measurement is divided into three stages. propeller cavitation noise measurement, background noise measurement and real-scale prediction.

In order to evaluate the sound source level of cavitation noise more accurately, it is necessary to correct the signal-to-noise ratio and sound field environment of the propeller cavitation noise measured by the test.

Finally, according to the similar relationship between the model and the real ship, the sound source level of the propeller cavitation noise of the prototype ship is predicted.

This document applies to the sound source level assessment of propeller cavitation noise during ship design.

2 Normative references

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, dated citations

documents, only the version corresponding to that date applies to this document; for undated references, the latest edition (including all amendments) applies to

this document.

GB/T 41311.1-2022 Acoustic description of the amount of underwater noise from ships and its measurement methods - Part 1.For comparison purposes

Deep water precision measurement requirements (ISO 17208-1.2016, IDT)

IEC 61260 Electroacoustic Octave and Band Band Filters (Electroacoustics-Octave-bandandfractional-

Note. GB/T 3241-2010 Electroacoustic Octave and Fractional Octave Filters (IEC 61260.1995, MOD)

ITTC Recommended Procedures and Guidelines 7.5-02-01-05 Model Scale for Propeller Cavitation Noise Measurements (Recommended

3 Terms and Definitions

The following terms and definitions apply to this document.