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**BIBLIOGRAPHY
FOR THE STUDY OF
PROPELLER-INDUCED
VIBRATION IN HULL
STRUCTURAL ELEMENTS**

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1978

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Naval Sea Systems Command
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Maritime Administration
United States Geological Survey
American Bureau of Shipping



An Interagency Advisory Committee
Dedicated to Improving the Structure of Ships

Address Correspondence to:
Secretary, Ship Structure Committee
U.S. Coast Guard Headquarters, (G-M/82)
Washington, D.C. 20590

SR-1240

AUG 1978

The rapid advance in ship size and power and the trend toward lighter hull scantlings prompted the Ship Structure Committee to investigate the propeller-induced vibrations in the hull and superstructure of the ship. High vibratory forces in the ship can cause discomfort in the living quarters, excessive "panting" type deflection of tank bulkheads, and fatigue cracks in webs and plating.

The first phase of this new project was to conduct a literature search. The bibliography developed is being published separately to be available at the October 15 - 16, 1978, Ship Vibration Symposium, sponsored jointly by the Ship Structure Committee and The Society of Naval Architects and Marine Engineers.

A handwritten signature in dark ink, appearing to read "Henry R. Bell". The signature is fluid and cursive, written over the printed name.

Henry R. Bell
Rear Admiral, U.S. Coast Guard
Chairman, Ship Structure Committee

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The Ship Design, Response, and Load Criteria Advisory Group prepared the project prospectus, evaluated the proposals for this project, provided the liaison technical guidance, and reviewed the project reports with the investigator:

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FINAL TECHNICAL REPORT

on

Project SR-1240

"Propeller-Induced Vibration in Hull Structural Elements"

BIBLIOGRAPHY FOR THE STUDY OF PROPELLER-INDUCED
VIBRATION IN HULL STRUCTURAL ELEMENTS

by

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Littleton Research & Engineering Corp.

under

Department of Transportation
United States Coast Guard
Contract No. DOT-CG-61907-A

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FOREWORD

This bibliography was prepared as part of the effort in Ship Structure Committee Project SR-1240, "Propeller-Induced Vibration in Hull Structural Elements." It is published separately from the final report because it can serve as a ready reference to investigators in the field.

This document is not meant to be an exhaustive bibliography of all references dealing with propeller-induced vibrations. Emphasis has been placed on the current generation of large, high-powered ships. This is evidenced by the fact that of the approximately 550 entries, over 60 percent were published after 1970.

The first part of the bibliography contains references which were reviewed and classified according to content. The nomenclature for this classification is given on page v. A supplemental bibliography covering subjects related directly to ship structures and ship vibration is also included. It contains references that were not reviewed, but which the investigators feel are important to the field. Finally, the bibliography lists references from other technological areas directly applicable to the problem of propeller-induced vibrations in ships.

CONTENTS

PART I: REVIEWED BIBLIOGRAPHY

- a. Cavitation Generated Forces
- b. Design Criteria
- c. Hull Response Prediction
- d. Human Reaction to Vibration
- e. Local Plating Response Prediction
- f. Main Shaft Response Prediction
- g. Propeller Forces and Moments
- h. Propeller Generated Pressures
- i. Propeller Rudder Interaction
- j. Propeller Vibration

PART II: SUPPLEMENTAL BIBLIOGRAPHY

- a. Ship Structures and Vibration
- b. General Structure
- c. General Structural Dynamics
- d. Rotor and Shaft Dynamics
- e. Statistical Energy Methods
- f. Substructuring Techniques

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NOMENCLATURE FOR THE BIBLIOGRAPHY CLASSIFICATION

SUBJECT:

CGF - CAVITATION GENERATED FORCES
DC - DESIGN CRITERIA
HRP - HULL RESPONSE PREDICTION
HRV - HUMAN REACTION TO VIBRATION
LPRP - LOCAL PLATING RESPONSE PREDICTION
MSRP - MAIN SHAFT RESPONSE PREDICTION
PF - PROPELLER FORCES AND MOMENTS
PP - PROPELLER GENERATED PRESSURES
PRI - PROPELLER RUDDER INTERACTION
PV - PROPELLER VIBRATION

MATHEMATICAL CONTENT:

VM - VERY MATHEMATICAL
MM - MODERATELY MATHEMATICAL
SM - SLIGHTLY OR NON-MATHEMATICAL

TYPE OF PAPER:

AT - ANALYTICAL
EX - EXPERIMENTAL
EXF - EXPERIMENTAL-FULL SCALE
EXM - EXPERIMENTAL-MODEL
SU - SURVEY

TECHNICAL UTILITY:

RD - RESEARCH AND DEVELOPMENT
DS - DESIGN ORIENTED

ADDITIONAL SYMBOLS

(XX REF) - NUMBER OF REFERENCES
(ABS) - REFERENCE CLASSIFIED FROM ABSTRACT

NOTES

100 - CAVITATION GENERATED POWER
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CODE OF ABBREVIATIONS FOR BIBLIOGRAPHY

ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
BSRA	BRITISH SHIP RESEARCH ASSOCIATION
DNV	DET NORSKE VERITAS
DTMB	DAVID TAYLOR MODEL BASIN (NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER)
IHI	ISHIKAWAJIMA-HARIMA HEAVY INDUSTRIES CO. LTD.
IME	INSTITUTE OF MARINE ENGINEERS
INA	INSTITUTE OF NAVAL ARCHITECTS
ISP	INTERNATIONAL SHIPBUILDING PROGRESS
ISSC	INTERNATIONAL SHIP STRUCTURES CONGRESS
JSNA	JOURNAL OF THE SOCIETY OF NAVAL ARCHITECTS
JSNAJ	JOURNAL OF THE SOCIETY OF NAVAL ARCHITECTS OF JAPAN
JSR	JOURNAL OF SHIP RESEARCH
MESJ	MARINE ENGINEERS SOCIETY OF JAPAN
MHI	MITSUBISHI HEAVY INDUSTRIES
NACA	NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS
NECIES	NORTH EAST COAST INSTITUTE OF ENGINEERS AND SHIPBUILDERS
NSRDC	NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER (DAVID TAYLOR MODEL BASIN)
RINA	ROYAL INSTITUTION OF NAVAL ARCHITECTS
RRIAM	REPORTS OF RESEARCH INSTITUTE FOR APPLIED MECHANICS, KYUSHU UNIVERSITY, JAPAN
SIT, DL	STEVENS INSTITUTE OF TECHNOLOGY, DAVIDSON LABORATORY
SNAME	SOCIETY OF NAVAL ARCHITECTS AND MARINE ENGINEERS
SSC	SHIP STRUCTURE COMMITTEE
TINA	TRANSACTIONS OF THE INSTITUTE OF NAVAL ARCHITECTS

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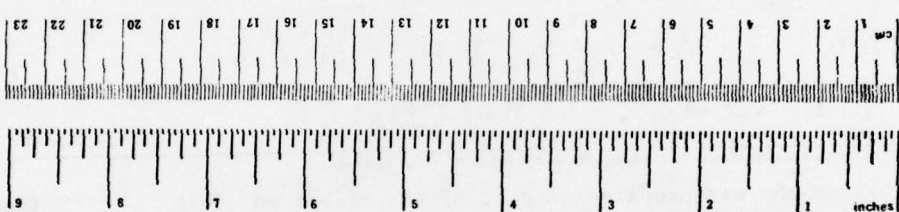
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METRIC CONVERSION FACTORS

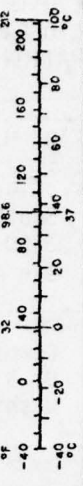


Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
in ft yd mi	inches feet yards miles	LENGTH		
		2.5	centimeters	cm
		30	centimeters	cm
		1.6	kilometers	km
m ² ft ² yd ² mi ²	square inches square feet square yards square miles acres	AREA		
		6.5	square centimeters	cm ²
		0.09	square meters	m ²
		0.8	square meters	m ²
		2.6	square kilometers	km ²
oz lb	ounces pounds short tons (2000 lb)	MASS (weight)		
		28	grams	g
		0.45 0.9	kilograms tonnes	kg t
tsp Tbsp fl oz c pt qt gal ft ³ yd ³	teaspoons tablespoons fluid ounces cups pints quarts gallons cubic feet cubic yards	VOLUME		
		5	milliliters	ml
		15	milliliters	ml
		30	milliliters	ml
		0.24	liters	l
		0.47	liters	l
		0.95	liters	l
		3.8	liters	l
0.03 0.76	cubic meters cubic meters	m ³ m ³		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

Approximate Conversions from Metric Measures

When You Know	Multiply by	To Find	Symbol	
millimeters centimeters meters kilometers	LENGTH			
	0.04	inches	in	
	0.4	inches	in	
	3.3	feet	ft	
square centimeters square meters square kilometers hectares (10,000 m ²)	AREA			
	1.2	square inches	in ²	
	2.5	square yards square miles acres	yd ² mi ² acres	
grams kilograms tonnes (1000 kg)	MASS (weight)			
	0.035	ounces	oz	
	2.2 1.1	pounds short tons	lb	
milliliters liters liters cubic meters cubic meters	VOLUME			
	0.03	fluid ounces	fl oz	
	2.1	pints	pt	
	1.06	quarts	qt	
	0.26 35 1.3	gallons cubic feet cubic yards	gal ft ³ yd ³	
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



* In 1924 reactivity. For other exact conversions and more detailed tables, see NBS 'Basic, Publ. 286, Units of Weights and Measures, Price \$2.25, SO Catalog No. O-11-10246.

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