

Resistance Prediction Of Planing Hulls State Of The Art

Engineering mathematics is a branch of applied mathematics where mathematical methods and techniques are implemented for solving problems related to the engineering and industry. It also represents a multidisciplinary approach where theoretical and practical aspects are deeply merged with the aim at obtaining optimized solutions. In line with that, the present Special Issue, 'Engineering Mathematics in Ship Design', is focused, in particular, with the use of this sort of engineering science in the design of ships and vessels. Articles are welcome when applied science or computation science in ship design represent the core of the discussion.

In 1974, a scientific conference covering marine automation group and large vessels issues was organized under the patronage of the Technical Naval Studies Centre (CETENA) and the Italian National Research Council (CNR). A later collaboration with the Marine Technical Association (ATENA) led to the renaming of the conference as NAV, extending the topics covered to the technical field previously covered by ATENA national conferences. The NAV conference is now held every 3 years, and attracts specialists from all over the world. This book presents the proceedings of NAV 2018, held in Trieste, Italy, in June 2018. The book contains 70 scientific papers, 35 technical papers and 16 reviews, and subjects covered include: comfort on board;

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conceptual and practical ship design; deep sea mining and marine robotics; protection of the environment; renewable marine energy; design and engineering of offshore vessels; digitalization, unmanned vehicles and cyber security; yacht and pleasure craft design and inland waterway vessels. With its comprehensive coverage of scientific and technical maritime issues, the book will be of interest to all those involved in this important industry.

Maritime Technology and Engineering 3 is a collection of papers presented at the 3rd International Conference on Maritime Technology and Engineering (MARTECH 2016, Lisbon, Portugal, 4-6 July 2016). The MARTECH Conferences series evolved from biannual national conferences in Portugal, thus reflecting the internationalization of the maritime sector. The keynote lectures and the papers, making up nearly 150 contributions, came from an international group of authors focused on different subjects in a variety of fields: Maritime Transportation, Energy Efficiency, Ships in Ports, Ship Hydrodynamics, Ship Structures, Ship Design, Ship Machinery, Shipyard Technology, Safety & Reliability, Fisheries, Oil & Gas, Marine Environment, Renewable Energy and Coastal Structures. This book will appeal to academics, engineers and professionals interested or involved in these fields.

The study of the hydrodynamic properties of planing bottom of flying boats and seaplane floats is at the present time based exclusively on the curves of towing tests conducted in tanks.

Air Lubrication and Air Cavity Technology is a major

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development that has emerged in recent years as a means to reduce resistance and powering for many types of ships, and an efficient design for high speed marine vessels. This book introduces the mechanisms for boundary layer drag reduction and concepts studied in early research work. Air bubble and sheet lubrication for displacement vessels is outlined and the key projects introduced. Generation of low volume flow air cavities under the hull of displacement, semi displacement and planing vessels are introduced together with theoretical and empirical analysis and design methods. Resistance reduction, power reduction and fuel efficiency are covered for both displacement and high speed vessels. Air layer and air cavity effects on vessel static and dynamic stability are covered, linked to regulatory requirements such as IMO. Seaway motions and reduced impact load of high speed craft in waves are discussed including model test results. Integration of propulsion systems for optimum powering is summarized. A design proposal for a wave piercing air cavity craft is included in an appendix. A comprehensive listing of document resources and internet locations is provided for further research.

The early development of the screw propeller. Propeller geometry. The propeller environment. The ship wake field, propeller performance characteristics.

High speed catamaran and multihull high speed marine vessel have become very popular in the last two decades. The catamaran has become the vessel of choice for the majority of high speed ferry operators worldwide. There have been significant

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advances in structural materials, and structural design has been combined with higher power density and fuel efficient engines to deliver ferries of increasing size. The multihull has proven itself to be a suitable configuration for active power projection across oceans as well as for coastal patrol and protection, operating at high speed for insertion or retrieval with a low energy capability. At present there is no easily accessible material covering the combination of hydrodynamics, aerodynamics, and design issues including structures, powering and propulsion for these vehicles. Coverage in High Speed Catamarans and Multihulls includes an introduction to the history, evolution, and development of catamarans, followed by a theoretical calculation of wave resistance in shallow and deep water, as well as the drag components of the multihull. A discussion of vessel concept design describing design characteristics, empirical regression for determination of principal dimensions in preliminary design, general arrangement, and methods is also included. The book concludes with a discussion of experimental future vehicles currently in development including the small waterplane twin hull vessels, wave piercing catamarans, planing catamarans, tunnel planing catamarans and other multihull vessels.

This SpringerBrief focuses on modeling and power evaluation of high-speed craft. The various power

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prediction methods, a principal design objective for high-speed craft of displacement, semi-displacement, and planing type, are addressed. At the core of the power prediction methods are mathematical models for resistance and propulsion efficiency. The models are based on the experimental data of various high-speed hull and propeller series. The regression analysis and artificial neural network (ANN) methods are used as an extraction tool for this kind of mathematical models. A variety of mathematical models of this type are discussed in the book. Once these mathematical models have been developed and validated, they can be readily programmed into software tools, thereby enabling the parametric analyses required for the optimization of a high-speed craft design. This book provides the foundational reference for these software tools, and their use in the design of high-speed craft. High-speed craft are very different from conventional ships. Current professional literature leaves a gap in the documentation of best design practices for high-speed craft. This book is aimed at naval architects who design and develop various types of high-speed vessels.

List of members in each volume.

The Definitive Reference for Designers and Design Students A solid grasp of the fundamentals of materials, along with a thorough understanding of

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load and design techniques, provides the components needed to complete a marine platform design. Design Principles of Ships and Marine Structures details every facet of ship design and design integration, and highlights the design aspects that must be put together to create an integrated whole product. This book discusses naval architecture and marine engineering applications and principles relevant to the design of various systems, examines advanced numerical techniques that can be applied to maritime design procedure at the concept design stage, and offers a comprehensive approach to the subject of ship design. Covers the Entire Sphere of Marine Design The book begins with an introduction to marine design and the marine environment, describing many of the marine products that are used for transportation, defense and the exploitation of marine resources. It also discusses stability issues relevant to ship design, as well as hydrodynamic aspects of resistance, propulsion, sea keeping and maneuvering, and their effects on design. In addition to covering the various systems and sub-systems that go into making a complex product to be used in maritime environment, the author explains engineering economics and its application in ship design, and provides examples wherever necessary. Written by an author with more than 35 years of teaching experience, this book: Describes various

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design methodologies such as sequential design process with the application of concurrent engineering and set based design factors in the use of computer-aided design techniques Highlights the shape design methodology of ship forms and layout design principles Considers design aspects relative to safety and risk assessment Introduces the design for production aspects in marine product development Discusses design principles for sustainability Explains the principles of numerical optimization for decision-making Design Principles of Ships and Marine Structures focuses on ship design efficiency, safety, sustainability, production, and management, and appeals to students and design professionals in the field of shipping, shipbuilding and offshore engineering.

Although the propeller lies submerged out of sight, it is a complex component in both the hydrodynamic and structural sense. This book fulfils the need for a comprehensive and cutting edge volume that brings together a great range of knowledge on propulsion technology, a multi-disciplinary and international subject. The book comprises three main sections covering hydrodynamics; materials and mechanical considerations; and design, operation and performance. The discussion relates theory to practical problems of design, analysis and operational economy, and is supported by extensive design information, operational detail and tabulated

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data. Fully updated and revised to cover the latest advances in the field, the new edition now also includes four new chapters on azimuthing and podded propulsors, propeller-rudder interaction, high-speed propellers, and propeller-ice interaction. · The most complete book available on marine propellers, fully updated and revised, with four new chapters on azimuthing and podded propulsors, propeller-rudder interaction, high-speed propellers, and propeller-ice interaction · A valuable reference for marine engineers and naval architects gathering together the subject of propulsion technology, in both theory and practice, over the last forty years · Written by a leading expert on propeller technology, essential for students of propulsion and hydrodynamics, complete with online worked examples

Mitochondrial dysfunction is increasingly being recognized as the basis of a wide variety of human diseases. Providing an authoritative update on our current knowledge of mitochondrial medicine, this text draws together world authorities from various fields to present general therapeutic strategies, as well as the treatments presently available in different specialties - thus making it essential reading for clinicians involved with the management of patients with mitochondrial diseases. A unique work, this text covers a range of specialties, including cardiology, ophthalmology, otology, nephrology, gastroenterology, hematology-oncology, and

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reproductive medicine, and does not focus exclusively on the more commonly known neurologic conditions. An accessible, user-friendly text, it also presents translational concepts of mitochondrial biogenesis and genetics in vignettes related to specific questions raised by the disease under discussion, rather than concentrating on basic science, which can often intimidate clinicians. This pioneering work is primarily directed to a clinical audience who are interested in the diverse and diagnostically challenging clinical presentations of mitochondrial diseases and their pathophysiology.

Hydrodynamics of High-Speed Marine Vehicles, first published in 2006, discusses the three main categories of high-speed marine vehicles - vessels supported by submerged hulls, air cushions or foils. The wave environment, resistance, propulsion, seakeeping, sea loads and manoeuvring are extensively covered based on rational and simplified methods. Links to automatic control and structural mechanics are emphasized. A detailed description of waterjet propulsion is given and the effect of water depth on wash, resistance, sinkage and trim is discussed. Chapter topics include resistance and wash; slamming; air cushion-supported vessels, including a detailed discussion of wave-excited resonant oscillations in air cushion; and hydrofoil vessels. The book contains numerous illustrations, examples and exercises.

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Developments in Maritime Transportation and Exploitation of Sea Resources covers recent developments in maritime transportation and exploitation of sea resources, encompassing ocean and coastal areas. The book brings together a selection of papers reflecting fundamental areas of recent research and development in the fields of:-
Ship Hydrodynamics-

This is volume 1 of a 2-volume set. Marine Design XIII collects the contributions to the 13th International Marine Design Conference (IMDC 2018, Espoo, Finland, 10-14 June 2018). The aim of this IMDC series of conferences is to promote all aspects of marine design as an engineering discipline. The focus is on key design challenges and opportunities in the area of current maritime technologies and markets, with special emphasis on:

- Challenges in merging ship design and marine applications of experience-based industrial design
- Digitalisation as technological enabler for stronger link between efficient design, operations and maintenance in future
- Emerging technologies and their impact on future designs
- Cruise ship and icebreaker designs including fleet compositions to meet new market demands

To reflect on the conference focus, Marine Design XIII covers the following research topic series:

- State of art ship design principles - education, design methodology, structural design, hydrodynamic design;
- Cutting

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edge ship designs and operations - ship concept design, risk and safety, arctic design, autonomous ships; •Energy efficiency and propulsions - energy efficiency, hull form design, propulsion equipment design; •Wider marine designs and practices - navy ships, offshore and wind farms and production.

Marine Design XIII contains 2 state-of-the-art reports on design methodologies and cruise ships design, and 4 keynote papers on new directions for vessel design practices and tools, digital maritime traffic, naval ship designs, and new tanker design for arctic. Marine Design XIII will be of interest to academics and professionals in maritime technologies and marine design.

This book presents the proceedings of the 12th International Symposium on High Speed Marine Vehicles, held virtually as an e-conference for the first time on 15 and 16 October 2020. High Speed Marine Vehicles Conference has almost 30-year history since the first Conference held in Naples in 1991. Since then, it has been an opportunity to present and discuss developments in the design, construction and operation of High Speed Marine Vessels. More than 40 abstracts were submitted for this edition of the conference, and following a rigorous review process, 26 papers were selected for inclusion in this book. These have been divided into 7 sections: CFD/EFD/sea trials; hydrofoils; multi-hull hydrodynamics; planing-hull hydrodynamics;

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propulsion and ship machinery; second generation intact stability criteria; and structures, loads, strength and materials. Topics covered include updated aspects of and developments in ship design, numerical and experimental hydrodynamics, seakeeping and maneuvering, and marine structures and machinery. This publication will be of interest to researchers from academia, industry, government agencies and certifying authorities, as well as designers and operators of high-speed vessels. This report is part of a series of reports that summarize this regular event. The report discusses research developments in ship design, construction, and operation in a forum that encouraged both formal and informal discussion of presented papers. The Twenty-Second Symposium on Naval Hydrodynamics was held in Washington, D.C., from August 9-14, 1998. It coincided with the 100th anniversary of the David Taylor Model Basin. This international symposium was organized jointly by the Office of Naval Research (Mechanics and Energy Conversion S&T Division), the National Research Council (Naval Studies Board), and the Naval Surface Warfare Center, Carderock Division (David Taylor Model Basin). This biennial symposium promotes the technical exchange of naval research developments of common interest to all the countries of the world. The forum encourages both formal and informal discussion of the presented papers, and the

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occasion provides an opportunity for direct communication between international peers.

This open access book gathers contributions presented at the International Joint Conference on Mechanics, Design Engineering and Advanced Manufacturing (JCM 2020), held as a web conference on June 2-4, 2020. It reports on cutting-edge topics in product design and manufacturing, such as industrial methods for integrated product and process design; innovative design; and computer-aided design. Further topics covered include virtual simulation and reverse engineering; additive manufacturing; product manufacturing; engineering methods in medicine and education; representation techniques; and nautical, aeronautics and aerospace design and modeling. The book is organized into four main parts, reflecting the focus and primary themes of the conference. The contributions presented here not only provide researchers, engineers and experts in a range of industrial engineering subfields with extensive information to support their daily work; they are also intended to stimulate new research directions, advanced applications of the methods discussed and future interdisciplinary collaborations.

High-speed boats that plane out of the water for reduced resistance are called planing crafts. When planing, the hull is mainly supported by the dynamic pressure loads rather than the hydrostatic buoyant force. A better physical understanding of the dynamic response of these crafts in calm water and rough water conditions and its relationship to hull loading is required for improved design and optimization. The loads and performance of a high-speed hull operating in rough water impact consideration several factors including personnel comfort and safety as well as structural design. The current work aims at developing high-performance computational models and validating the simulation results

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against experimental measurements for a Generic Prismatic Planing Hull (GPPH) operating in calm water and slamming when running in head waves (both regular and irregular). Previous calm water studies showed difficulties in predicting the calm water running trim. Using dynamic overset grids and accurate hydrostatic set-up conditions and hull geometry, we were able to reduce the calm water prediction errors to 2.52%D for resistance, sinkage, and trim. Previous computational studies of high-speed hulls in rough water focused primarily on simple geometries, like a wedge, and sphere at zero speed and for strip theory predictions. This study provides URANS capabilities for high-speed planing hulls in regular and irregular waves. Specifically, it was determined that small time steps and large grids are needed to resolve the spray root and the temporal evolution of the impulsive local slamming pressure loads. In rough water simulations, re-entering and emerging peaks are shown during slamming events. The re-entering slam is due to the hull dropping into the water surface after becoming airborne, and the emerging slam is due to the hull emerging from the next wave peak and being pushed airborne again. From irregular wave results, extreme slam events are determined on which a correlation study is conducted. The validation included motions, accelerations, and re-entering and emerging slamming pressures, with very good agreement to the experimental measurements. In the future study, fluid-structure interaction needs to consider during slamming events.

The present report deals with the processes accompanying the planing of a planing boat or a seaplane on water . The study is largely based upon theoretical investigations; mathematical problems and proofs are not discussed. To analyze theoretically actual planing processes, giving due consideration to all aspects of the problem, is probably not

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possible. The theories therefore treat various simple limiting cases, which in their entirety give a picture of the planing processes and enable the interpretation of the experimental results. The discussion is concerned with the stationary planing attitude: the boat planes at a constant speed V on an originally smooth surface.

This book gathers papers presented at the International Joint Conference on Mechanics, Design Engineering and Advanced Manufacturing (JCM 2016), held on 14-16 September, 2016, in Catania, Italy. It reports on cutting-edge topics in product design and manufacturing, such as industrial methods for integrated product and process design; innovative design; and computer-aided design. Further topics covered include virtual simulation and reverse engineering; additive manufacturing; product manufacturing; engineering methods in medicine and education; representation techniques; and nautical, aeronautics and aerospace design and modeling. The book is divided into eight main sections, reflecting the focus and primary themes of the conference. The contributions presented here will not only provide researchers, engineers and experts in a range of industrial engineering subfields with extensive information to support their daily work; they are also intended to stimulate new research directions, advanced applications of the methods discussed, and future interdisciplinary collaborations. Practical Ship Hydrodynamics provides a comprehensive overview of hydrodynamic experimental and numerical methods for ship resistance and propulsion, maneuvering, seakeeping and vibration. Beginning with an overview of problems and approaches, including the basics of modeling and full scale testing, expert author Volker Bertram introduces the marine applications of computational fluid dynamics and boundary element methods. Expanded and updated, this new edition includes: Otherwise disparate information on the

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factors affecting ship hydrodynamics, combined to provide one practical, go-to resource. Full coverage of new developments in computational methods and model testing techniques relating to marine design and development. New chapters on hydrodynamic aspects of ship vibrations and hydrodynamic options for fuel efficiency, and increased coverage of simple design estimates of hydrodynamic quantities such as resistance and wake fraction. With a strong focus on essential background for real-life modeling, this book is an ideal reference for practicing naval architects and graduate students.

The proposed book addresses various power prediction methods, a principal design objective for high-speed craft of displacement, semi-displacement, and planing type. At the core of the power prediction methods are mathematical models based on experimental data derived from various high-speed hull and propeller series. Regression analysis and Artificial Neural Network (ANN) methods are used as extraction tools for this kind of models. The most significant factors for in-service power prediction are bare hull resistance, dynamic trim, and the propeller's open-water efficiency. Therefore, mathematical modeling of these factors is a specific focus of the book. Furthermore, the book includes a summary of most of the power-prediction-relevant literature published in the last 50 years, and as such is intended as a reference overview of the best high-speed craft modeling practices. Once these mathematical models have been developed and validated, they can be readily programmed into software tools, thereby enabling the parametric analyses required for the optimization of a high-speed craft design. The proposed book is intended primarily for naval architects who design and develop various types of high-speed vessels (yachts, boats etc.), as well as for students who are interested in the design of fast vessels. The

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book includes useful Excel Macro Codes for the outlined mathematical models. Moreover, software for all considered models is provided.

Enhanced Resistance Prediction of Round-bilge Semi-planing Hull Forms
Power Prediction Modeling of Conventional High-Speed Craft
Springer Nature

This second edition provides a comprehensive and scientific approach to evaluating ship resistance and propulsion.

Written by experts in the field, it includes the latest developments in CFD, experimental techniques and guidance for the practical estimation of ship propulsive power. It addresses improvements in energy efficiency and reduced emissions, and the introduction of the Energy Efficiency Design Index (EEDI). Descriptions have now been included of pump jets, rim driven propulsors, shape adaptive foils, propeller noise and dynamic positioning. Trial procedures have been updated, and preliminary estimates of power for hydrofoil craft, submarines and AUVs are incorporated. Standard series data for hull resistance and propeller performance are included, enabling practitioners to make ship power predictions based on material and data within the book. Numerous fully worked examples illustrate applications for most ship and small craft types, making this book ideal for practising engineers, naval architects, marine engineers and undergraduate and postgraduate students.

Collection of selected, peer reviewed papers from the 2013 International Conference on Applied Mechanics, Mechatronics and Intelligent System (AMMIS2013), April 19-21, 2013, Changsha, China. The 57 papers are grouped as follows: Chapter 1: Applied Mechanics; Chapter 2: Sensors, Measurement Technologies and Equipment; Chapter 3: Mechatronics and Automation; Chapter 4: Intelligent System and Information Processing Technology.

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