

### Full scale validation of CFD model of self-propelled ship

# Master Thesis



Henrik Mikkelsen Mads Lund Steffensen June 2016

## Full Scale Validation Of Cfd Model Of Self Propelled Ship

Judd E. Hollander

#### Full Scale Validation Of Cfd Model Of Self Propelled Ship:

**HSMV 2023** E. Begovic, 2023-11-09 A growing awareness for sustainable mobility and the importance of reducing greenhouse gas emissions call for immediate action in the maritime industry Technical improvements such as the hydrodynamic optimization innovations in energy saving devices new propulsion systems and power supplies can contribute to such achievements This challenge is even more demanding for high speed marine craft This book presents the proceedings of HSMV2023 the 13th International Symposium on High Speed Marine Vehicles held from 23 to 25 October 2023 in Naples Italy The conference attracts academics researchers designers operators and shipowners It provides a platform for the presentation and discussion of developments in the design construction and operation of high speed marine vessels More than 40 submissions were received 27 papers were selected for presentation and publication in this book after a rigorous review process The book provides an overview of current innovations and developments and can be a reference for all those Selected Papers from the Sixth International Symposium on working in the field of high speed marine vehicles Marine Propulsors Sverre Steen, Kourosh Koushan, 2020-12-29 Marine propulsors are key components of the many thousands of ships and boats operating in oceans lakes and rivers around the world The performance of propulsors are important for the environmental impact of ships underwater noise impact on aquatic fauna and crew and passenger comfort and safety This book presents nineteen papers devoted to the hydrodynamics of different types of marine propulsors conventional propellers thrusters and novel solutions Most of the papers are extended papers from the sixth International Symposium on Marine Propulsors SMP 2019 Several of the papers deal with cavitation vortices and energy saving devices The papers present high quality research performed using Computational Fluid Dynamics CFD and Experimental Fluid Dynamics EFD as well Artificial Intelligence AI Practical Design of Ships and Other Floating Structures Tetsuo Okada, Katsuyuki Suzuki, Yasumi Kawamura, 2020-10-05 This book gathers the peer reviewed proceedings of the 14th International Symposium PRADS 2019 held in Yokohama Japan in September 2019 It brings together naval architects engineers academic researchers and professionals who are involved in ships and other floating structures to share the latest research advances in the field The contents cover a broad range of topics including design synthesis for ships and floating systems production hydrodynamics and structures and materials Reflecting the latest advances the book will be of interest to researchers and practitioners alike Practical Ship Hydrodynamics Volker Bertram, 2012 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 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

Jahrbuch Der Schiffbautechnischen Gesellschaft Stg Schiffbautechnische, 2007-02-04 Die Tagungsbeitr ge der Sprechtage der Schiffbautechnischen Gesellschaft geben einen berblick ber die aktuellen Probleme im Schiffbau Das Werk wendet sich an Fachleute im Schiffbau und sollte in jedem Werkbetrieb in schiffbautechnischen Instituten und Advances in Maritime Technology and Engineering Carlos Guedes Versuchsanstalten in der Bibliothek stehen Soares, Tiago A. Santos, 2024-05-08 Advances in Maritime Technology and Engineering comprises a collection of the papers presented at the 7th International Conference on Maritime Technology and Engineering MARTECH 2024 held in Lisbon Portugal on 14 16 May 2024 This Conference has evolved from the series of biannual national conferences in Portugal which have become an international event reflecting the internationalization of the maritime sector and its activities MARTECH 2024 is the seventh of this new series of biannual conferences This book comprises 142 contributions that were reviewed by an International Scientific Committee Advances in Maritime Technology and Engineering is dedicated to maritime transportation ports as well as maritime safety and reliability It further comprises sections dedicated to ship design cruise ship design and to the structural aspects of ship design such as ultimate strength and composites subsea structures as pipelines and to ship building and ship repair The Proceedings in Marine Technology and Ocean Engineering series is dedicated to the publication of proceedings of peer reviewed international conferences dealing with various aspects of Marine Technology and Ocean Engineering The series includes the proceedings of the following conferences the International Maritime Association of the Mediterranean IMAM conferences the Marine Structures MARSTRUCT conferences the Renewable Energies Offshore RENEW conferences and the Maritime Technology MARTECH conferences The Marine Technology and Ocean Engineering series is also open to new conferences that cover topics on the sustainable exploration of marine resources in various fields such as maritime transport and ports usage of the ocean including coastal areas nautical activities the exploration and exploitation of mineral resources the protection of the marine environment and is resources and risk analysis safety and reliability The aim of the series is to stimulate advanced education and training through the wide dissemination of the results of scientific research Sustainable Development and Innovations in Marine Technologies Petar Georgiev, Carlos Guedes Soares, 2019-08-22 Sustainable Development and Innovations in Marine Technologies includes the papers presented at the 18th International Congress of the Maritime Association of the Mediterranean IMAM 2019 Varna Bulgaria 9 11 September 2019 Sustainable Development and Innovations in Marine Technologies includes a wide range of topics Aquaculture Construction Defence Design Dynamic response of structures Degradation Defects in structures Electrical

equipment of ships Human factors Hydrodynamics Legal Social aspects Logistics Machinery Marine environmental protection Materials Navigation Noise Non linear motions manoeuvrability Off shore and coastal development Off shore renewable energy Port operations Prime movers Propulsion Safety at sea Safety of Marine Systems Sea waves Seakeeping Shaft Ship resistance Shipyards Small Stability Static response of structures Structures and Wind loads The IMAM series of Conferences started in 1978 when the first Congress was organised in Istanbul Turkey IMAM 2019 is the eighteenth edition and in its nearly forty years of history this biannual event has been organised throughout Europe Sustainable Development and Innovations in Marine Technologies is essential reading for academics engineers and all professionals involved in the area of sustainable and innovative marine technologies **Mathematical Modeling of Inland Vessel Maneuverability** Considering Rudder Hydrodynamics Jialun Liu, 2020-05-11 This book demonstrates that different rudder configurations have different hydrodynamic characteristics which are influenced by the profile the parameters and the specific configuration The author proposes new regression formulas to help naval architects quickly estimate the rudder induced forces and moments in maneuvering Furthermore the author proposes and validates an integrated maneuvering model for both seagoing ships and inland vessels Using the proposed regression formulas and maneuvering model the specific impacts of rudder configurations on inland vessel maneuverability are studied In turn the book demonstrates the application of Reynolds Averaged Navier Stokes RANS simulations to obtain rudder hydrodynamic characteristics and the integration of the RANS results into maneuvering models as an accurate estimation of rudder forces and moments needed to quantify the impacts of rudder configurations on ships maneuvering performance In addition the author proposes new criteria for the prediction and evaluation of inland vessel maneuverability Simulations of ships with various rudder configurations are presented in order to analyze the impacts of rudder configurations on ship maneuverability in different classic and proposed test maneuvers Offering essential guidance on the effects of rudders for inland vessel maneuverability and helping practical engineers make informed design choices the book is of interest to researchers and academics in the field of naval engineering as well as students of naval architecture Industrial practitioners working on ship design may also find it beneficial Engineering Applications for New Materials and Technologies Andreas Öchsner, 2018-01-25 This book discusses the expertise skills and techniques needed for the development of new materials and technologies It focuses on finite element and finite volume methods that are used for engineering simulations and present many state of the art applications and advances to highlight these methods importance For example modern joining technologies can be used to fabricate new compound or composite materials even those formed from dissimilar component materials. These composite materials are often exposed to harsh environments must deliver specific characteristics and are primarily used in automotive and marine technologies i e ships amphibious vehicles docks offshore structures and even robots To achieve the desired material performance computer based engineering tools are widely used for simulation data evaluation and design processes

Twenty-Second Symposium on Naval Hydrodynamics National Research Council, Naval Surface Warfare Center, Carderock Division, Office of Naval Research, Division on Engineering and Physical Sciences, Commission on Physical Sciences, Mathematics, and Applications, Naval Studies Board, 2000-03-02 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 occasion provides an opportunity for direct communication between international peers

<u>Technology and Science for the Ships of the Future</u> E. Rizzuto, V. Ruggiero, 2022-09-29 The oceans are a key resource for transportation energy and material extraction and food production representing one of the most important environments on the planet Technological developments enabling us to exploit marine resources in a sustainable way are therefore of the greatest importance This book presents the proceedings of the NAV 2022 conference held in Genoa and La Spezia Italy from 15 to 17 June 2022 The conference is held every 3 years attracting specialists in marine technology from all over the world NAV 2022 was the 20th edition of the conference and covered a full spectrum of maritime technology themes all related to the exploitation of sea resources. The book contains 87 scientific papers covering subjects ranging from comfort on board to 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 and cyber security unmanned vehicles yacht and pleasure craft design and inland waterway vessels Providing a comprehensive coverage of the latest scientific and technical maritime issues the book will be of interest to all those involved in this vital global industry Marine Design XIII, Volume 2 Pentti Kujala, Liangliang Lu, 2018-06-04 This is volume 2 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 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 **Dynamics, Computational Modeling and Applications** L. Hector Juarez, 2012-02-24 The content of this book covers several up to date topics in fluid dynamics computational modeling and its applications and it is intended to serve as a general reference for scientists engineers and graduate students The book is comprised of 30 chapters divided into 5 parts which include winds building and risk prevention multiphase flow structures and gases heat transfer combustion and energy medical and biomechanical applications and other important themes This book also provides a comprehensive overview of computational fluid dynamics and applications without excluding experimental and theoretical aspects XIII Pentti Kujala, Liangliang Lu, 2018-06-11 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 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 **Ship Resistance and Propulsion** interest to academics and professionals in maritime technologies and marine design Anthony F. Molland, Stephen R. Turnock, Dominic A. Hudson, 2017-08-17 This updated edition provides a modern scientific approach to evaluating ship resistance and propulsion for a range of ship types Numerical Ship Hydrodynamics Takanori Hino, Frederick Stern, Lars Larsson, Michel Visonneau, Nobuyuki Hirata, Jin Kim, 2020-07-25 This book explores computational fluid dynamics applied to ship hydrodynamics and provides guidelines for the future developments in the field based on the Tokyo 2015 Workshop It presents ship hull test cases experimental data and submitted computational methods conditions grids and results Analysis is made of errors for global resistance sinkage trim and self propulsion and local flow wave

elevations mean velocities and turbulence variables including standard deviations for global variables The effects of grid size and turbulence models are evaluated for both global and local flow variables Detailed analysis is made of turbulence modeling capabilities for capturing local flow physics Errors and standard deviations are also assessed for added resistance captive test cases and course keeping speed loss free running test cases in head and oblique waves All submissions are used to evaluate the error and uncertainty by means of a systematic verification and validation V V study along with statistical International Committee Reports, Introductory Remarks, Discussions, and Conclusions *Innovations in the Analysis and Design of Marine Structures* Yordan International Towing Tank Conference, 1993 Garbatov, C. Guedes Soares, 2025-05-09 Innovations in the Analysis and Design of Marine Structures is a collection of papers presented at MARSTRUCT 2025 the 10th International Conference on Marine Structures MARSTRUCT 2025 Lisbon Portugal 20 22 May 2025 The contributions cover a wide range of topics including Loads and load effects Strength assessment Experimental analysis of structures Materials and fabrication of structures Structural design and optimization Structural reliability and safety Innovations in the Analysis and Design of Marine Structures is essential reading for academics engineers and professionals involved in the design of marine and offshore structures The Proceedings in Marine Technology and Ocean Engineering series is devoted to the publication of proceedings of peer reviewed international conferences dealing with various aspects of Marine Technology and Ocean Engineering The Series includes the proceedings of the following conferences the Marine Structures MARSTRUCT Conferences the Maritime Technology MARTECH Conferences the Renewable Energies Offshore RENEW Conferences the Collision and Grounding of Ships and Offshore Structures ICCGS Conferences and the International Maritime Association of the Mediterranean IMAM Conferences The Marine Technology and Ocean Engineering series is also open to new conferences that cover topics on the sustainable exploration and exploitation of marine resources in various fields such as maritime transport and ports usage of the ocean including coastal areas nautical activities the exploration and exploitation of mineral resources the protection of the marine environment and its resources and risk analysis safety and reliability The aim of the series is to stimulate advanced education and training through the wide dissemination of the results of scientific research **Ship Resistance and Propulsion** Mr. Rohit Manglik, 2024-05-22 EduGorilla Publication is a trusted name in the education sector committed to empowering learners with high quality study materials and resources Specializing in competitive exams and academic support EduGorilla provides comprehensive and well structured content tailored to meet the needs of students across various streams and levels

**Sustainable Development and Innovations in Marine Technologies** Selma Ergin, C. Guedes Soares, 2022-09-13 Sustainable Development and Innovations in Marine Technologies includes the papers presented at the 19th International Congress of the International Association of the Mediterranean IMAM 2022 Istanbul Turkey 26 29 September 2022 one of the major conferences in maritime industry The Congress has a history of more than forty years since the first Congress was

held in Istanbul in 1978 IMAM 2022 is the fourth congress hosted by Istanbul in its history The IMAM congresses concentrate their activities in the thematic areas of Ship Building and Repair Maritime Transportation and Logistics Hydrodynamics Marine Structures Machinery and Control Design and Materials Marine Environment Safety of Marine Systems Decarbonisation and Digitalization Off shore and Coastal Development Noise and Vibration Defense and Security Off shore Renewable Energy Sustainable Development and Innovations in Marine Technologies is essential reading for academics engineers and all professionals involved in sustainable and innovative marine technologies

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