

## EDITORIAL BOARD OF THE JOURNAL OF MARITIME & TRANSPORTATION SCIENCES

Editor in Chief:

Siniša Vilke, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia

Nikolai Atanasov Velikov, Ph. D., N. Y. Vaptsarov Naval Academy, Faculty of Navigation, Bulgaria

Mate Barić, Ph. D., University of Zadar, Maritime Department, Croatia

Željko Bartulović, Ph. D., University of Rijeka, Faculty of Law, Croatia

David Brčić, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia

Borna Debelić, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia

Aleksandra Deluka-Tibljaš, Ph. D., University of Rijeka, Faculty of Civil Engineering, Croatia

Julijan Dobrinić, Ph. D., University of Rijeka, Faculty of Engineering, Croatia

Mohamed El Kalla, Ph. D., Arab Academy for Science, Technology & Maritime Transport, Alexandria, Egypt

Daniela Gračan, Ph. D., University of Rijeka, Faculty of Tourism and Hospitality Management Opatija, Croatia

Neven Grubišić, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia

Marko Hadjina, Ph. D., University of Rijeka, Faculty of Engineering, Croatia

Goran Kniewald, Ph. D., Ruder Bošković Institute Zagreb, Croatia

Rob Konings, Ph. D., Delft University of Technology, OTB Research Institute Delft, Netherlands

Ljudevit Krpan, Ph. D., Primorje-Gorski Kotar County, Croatia

Livia Maglić, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia

Lovro Maglić, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia

Vladislav Maraš, Ph. D., University of Belgrade, Faculty of Transport and Traffic Engineering, Serbia

Marinko Maslarić, Ph. D., University of Novi Sad, Faculty of Technical Sciences, Serbia

Tin Matulja, Ph. D., University of Rijeka, Faculty of Engineering, Croatia

Vedran Mrzljak, Ph. D., University of Rijeka, Faculty of Engineering, Croatia

Emanuela Nan, Ph. D., University of Genoa, Department of Civil, Chemical and Environmental Engineering, Italy

Josip Orović, Ph. D., University of Zadar, Maritime Department, Croatia

Helga Pavlič Skender, Ph. D., University of Rijeka, Faculty of Economics, Croatia

Joško Parunov, Ph. D., University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture, Croatia

Edvard Tijan, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia

Elen Twrdy, Ph. D., University of Ljubljana, Faculty of Maritime Studies and Transport, Slovenia

Maja Uran Maravić, Ph. D., University of Primorska, Faculty of Tourism Studies-Turistica, Slovenia

Goran Vojković, Ph. D., University of Zagreb, Faculty of Transport and Traffic Sciences, Croatia

Albert Zamarin, Ph. D., University of Rijeka, Faculty of Engineering, Croatia

Language Editor:

Zdenka Rogić

The Journal of Maritime & Transportation Sciences is issued twice a year. Current edition is 50 paperback copies.

Electronic typeface and print: Tiskara i grafika Viškovo d.o.o.

Printed in July 2021.

## REVIEWERS

(in alphabetical order):

Saša Aksentijević, Ph. D., Aksentijevic Forensics and Consulting, Ltd., Croatia  
Romina Alkier, Ph. D., University of Rijeka, Faculty of Tourism and Hospitality Management Opatija, Croatia  
Nikolai Atanasov Velikov, Ph. D., N. Y. Vaptsarov Naval Academy, Faculty of Navigation, Bulgaria  
Lidija Bagarić, Ph. D., University of Rijeka, Faculty of Tourism and Hospitality Management Opatija, Croatia  
Mate Barić, Ph. D., University of Zadar, Maritime Department, Croatia  
Hrvoje Baričević, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Željko Bartulović, Ph. D., University of Rijeka, Faculty of Law, Croatia  
Dean Bernečić, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Toni Bielić, Ph. D., University of Zadar, Maritime Department, Croatia  
Jasna Blašković Zavada, Ph. D., University of Zagreb, Faculty of Transport and Traffic Sciences, Croatia  
Dragan Bolanča, Ph. D., University of Zagreb, Faculty of Law, Croatia  
Mirjana Borucinsky, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
David Brčić, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Aleksandar Cuculić, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Jasmin Čelić, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Borna Debelić, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Roko Dejhalla, Ph. D., University of Rijeka, Faculty of Engineering, Croatia  
Aleksandra Deluka-Tibljaš, Ph. D., University of Rijeka, Faculty of Civil Engineering, Croatia  
Julijan Dobrinčić, Ph. D., University of Rijeka, Faculty of Engineering, Croatia  
Davor Dujak, Ph. D., University of Osijek, Faculty of Economics, Croatia  
Nastia Degiuli, Ph. D., University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture, Croatia  
Nikša Fafandel, Ph. D., University of Rijeka, Faculty of Engineering, Croatia  
Vlado Frančić, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Daniela Gračan, Ph. D., University of Rijeka, Faculty of Tourism and Hospitality Management Opatija, Croatia  
Neven Grubišić, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Draško Holcer, Ph. D., Croatian Natural History Museum, Croatia  
Iva Horvat, Ph. D., Port Authority Vukovar, Croatia  
Alen Jugović, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Marko Hadjina, Ph. D., University of Rijeka, Faculty of Engineering, Croatia  
Svjetlana Hess, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Bojan Hlača, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Jakov Karmelić, Ph. D., CMA-CGM Croatia  
Natalija Kavran, Ph. D., University of Zagreb, Faculty of Transport and Traffic Sciences, Croatia  
Goran Kniewald, Ph. D., Ruder Bošković Institute, Croatia  
Ines Kolanović, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Rob Konings, Ph. D., Delft University of Technology, OTB Research Institute Delft, Netherlands  
Vesna Kovač, Ph. D., University of Rijeka, Faculty of Humanities and Social Sciences, Croatia  
Božidar Kovačić, Ph. D., University of Rijeka, Department of Informatics, Croatia  
Mirjana Kovačić, Ph. D., Regional Development Agency of the Primorje-Gorski Kotar County, Croatia

Maja Krčum, Ph. D., University of Split, Faculty of Maritime Studies, Croatia  
Ivan Kristek, Ph. D., University of Osijek, Faculty of Economics, Croatia  
Marinela Krstinić Nižić, Ph. D., University of Rijeka, Faculty of Tourism and Hospitality Management Opatija, Croatia  
Boris Ljubenkov, Ph. D., University of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, Croatia  
Axel Luttenberger, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Livia Maglič, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Lovro Maglič, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Davor Mance, Ph. D., University of Rijeka, Faculty of Economics, Croatia  
Vladislav Maraš, Ph. D., University of Belgrade, Faculty of Transport and Traffic Engineering, Serbia  
Marinko Maslarić, Ph. D., University of Novi Sad, Faculty of Technical Sciences, Serbia  
Ivan Mencer, Ph. D., University of Rijeka, Faculty of Economics, Croatia  
Robert Mohović, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Tomislav Mrakovčić, Ph. D., University of Rijeka, Faculty of Engineering, Croatia  
Vedran Mrzljak, Ph. D., University of Rijeka, Faculty of Engineering, Croatia  
Emanuela Nan, Ph. D., University of Genoa, Department of Civil, Chemical and Environmental Engineering, Italy  
Mijo Nikolić, Ph. D., University of Split, Faculty of Civil Engineering, Architecture and Geodesy, Croatia  
Josip Orović, Ph. D., University of Zadar, Maritime Department, Croatia  
Helga Pavlič Skender, Ph. D., University of Rijeka, Faculty of Economics, Croatia  
Tanja Poletan Jugović, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Rene Prenc, Ph. D., University of Rijeka, Faculty of Engineering, Croatia  
Jasna Prpić - Oštrić, Ph. D., University of Rijeka, Faculty of Engineering, Croatia  
Radoslav Radonja, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Tomislav Rožić, Ph. D., University of Zagreb, Faculty of Transport and Traffic Sciences, Croatia  
Igor Rudan, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Biserka Rukavina, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Tomislav Senčić, Ph. D., University of Rijeka, Faculty of Engineering, Croatia  
Đani Šabalja, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Zvonimira Šverko Grdić, Ph. D., University of Rijeka, Faculty of Tourism and Hospitality Management Opatija, Croatia  
Vinko Tomas, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Elen Twrdy, Ph. D., University of Ljubljana, Faculty of Maritime Studies and Transport, Slovenia  
Maja Uran Maravić, Ph. D., University of Primorska, Faculty of Tourism Studies-Turistica, Slovenia  
Tea Golja, Ph. D., University of Pula, Faculty of Interdisciplinary, Italian and Cultural Studies, Croatia  
Goran Vojković, Ph. D., University of Zagreb, Faculty of Transport and Traffic Sciences, Croatia  
Dubravko Vučetić, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Zrinka Zadel, Ph. D., University of Rijeka, Faculty of Tourism and Hospitality Management Opatija, Croatia  
Damir Zec, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia  
Ratko Zelenika, Ph. D., University of Rijeka, Faculty of Economics, Croatia  
Saša Žiković, Ph. D., University of Rijeka, Faculty of Economics, Croatia  
Ranko Žugaj, Ph. D., University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering, Croatia  
Srdan Žuškin, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia

PUBLISHER:

ASSOCIATION FOR RESEARCH AND DEVELOPMENT OF MARITIME INDUSTRIES

Address: Studentska 2, 51000 Rijeka, Croatia

Phone: +385 (0)91 443 4475

E-mail: [udrugapomorstvo@gmail.com](mailto:udrugapomorstvo@gmail.com)

PRINTING OF THE JOURNAL OF MARITIME & TRANSPORTATION SCIENCES WAS  
CO-FINANCED BY PRIMORSKO-GORANSKA COUNTY



PRESIDENCY OF ASSOCIATION FOR RESEARCH AND DEVELOPMENT OF MARITIME INDUSTRIES

President:

Borna Debelić, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia

Presidency Members:

Toni Bilić, Ph. D., University of Zadar, Department of Maritime Studies, Croatia

David Brčić, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia

Andrea Russo, Ph. D., University of Split, Faculty of Maritime Studies, Croatia

Ivan Jakšić, P.M.Oec., Port of Rijeka authority, Croatia

Julijan Dobrinčić, Ph. D., University of Rijeka, Faculty of Engineering, Croatia

Siniša Vilke, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia

Borna Debelić, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia

Ines Ostović, mag. Ing. traff., University of Rijeka, Faculty of Maritime Studies, Croatia

Supervisory Board:

Loris Rak, dipl. iur., University of Rijeka, Faculty of Maritime Studies, Croatia

Biserka Rukavina, Ph. D., University of Rijeka, Faculty of Maritime Studies, Croatia

Jakov Karmelić, Ph. D., CMA-CGM Croatia

Secretary:

Ines Ostović, mag. Ing. traff., University of Rijeka, Faculty of Maritime Studies, Croatia

Papers published in the Journal of Maritime & Transportation Sciences are indexed in the following databases:

ASFA (CSA) Aquatic Sciences and Fisheries Abstracts

TRID – the TRIS and ITRD database

EBSCO Academic Search Complete

PROQUEST - Natural Science Collection, SciTech Collection, Technology Collection Ulrich's Intl Periodicals Directory

News of New Electronic Journals

ZDB - Zeitschriftendatenbank

PROQUEST-ZDB – Zeitschriftendatenbank

Worldcat Libraries

HRČAK

UDC is performed by University Library Rijeka.