

CV of *Eng.* GIULIANO VERNENGO, *PhD.*

Research Fellow, University of Genoa, Italy.

PostDoc Associate, Massachusetts Institute of Technology, MA, USA, 2015.

PhD. in Numerical Marine Hydrodynamics, University of Genoa, Italy, 2012.

Certified to the Italian Corporation of Engineers.

Place and date of birth: Chiavari, Italy, 18th December 1983

Current address:

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Work Experiences

From June 2015, University of Genoa, DITEN

Research Fellow (Assegno di ricerca)

Supervisor: Prof. Dario Bruzzone

Seakeeping analysis of high-speed SWATH vessels

Work scope:

- Analysis of the effect of the geometric parameters of the SWATH on its seakeeping performances
- Comparative seakeeping study with respect to other equivalent multi-hull configurations

From May 2015 to May 2016, Massachusetts Institute of Technology, MIT, Mechanical Engineering Department (MechE)

PostDoc Associate

Supervisor: Prof. Stefano Brizzolara

Scalable Framework for Hierarchical Design under Uncertainty with Application to Marine Vehicles

[Grant funded by ONR N000141310332 and DARPA N66001-15-2-4055]

Work scope:

- Optimization of super-cavitating unconventional 2D sections
- Design of medium fidelity methods (lifting line and vortex lattice methods) for the analysis of super-cavitating 3D hydrofoils

- Formulation of a set-based design approach for global design of unmanned SWATH vessels
- Integration of the CFD techniques into a Multi-fidelity optimization framework

From May 2015 to June 2015, University of Genoa, DITEN

Supervisor: Prof. Dario Bruzzone

Integration of a method for Added Resistance computation with the software ANSYS-Aqwa

[Project commissioned by RINA (Registro Italiano Navale)]

Work scope:

- Update the added resistance computation based on the Near Field Method
- Integration of the Added Resistance Method with the software ANSYS-Aqwa

From May 2014 to May 2015, Massachusetts Institute of Technology, MIT, Sea Grant College Program

Visiting Research Scholar

Supervisor: Prof. Stefano Brizzolara

Creation of a Vortex Lattice Method (VLM) coupled with a 2D+t side wake model and a Smoothed Particle Hydrodynamic (SPH) solver for the hydrodynamic analysis of cambered stepped planing surfaces.

[Grant funded by the Office of Naval Research, ONR Grant N000141310332]

Work scope:

- Test of the methodology created during the previous grant.
- Towing Tank Test at the United States Naval Academy (USNA) facility
- Inclusion of a cavitation model for stepped planing hulls
- Application of the method to design a new stepped cambered planing hull

From May 2013 to May 2014, Massachusetts Institute of Technology, MIT, Sea Grant College Program

Visiting Research Scholar

Supervisor: Prof. Chryssostomos Chryssostomidis

Creation of a Vortex Lattice Method (VLM) coupled with a 2D+t side wake model and a Smoothed Particle Hydrodynamic (SPH) solver for the hydrodynamic analysis of cambered stepped planing surfaces.

[Grant funded by the Office of Naval Research, ONR Grant N000141310332]

Work scope:

- Development of the software.
- Validation of the analysis method for prismatic hulls.
- Extension of the method to *cambered* stepped planing hulls.
- Validation of the method for cambered stepped planing hulls.
- Design of a new hull.

From February 2013 to January 2015, University of Genoa, DITEN
Research Fellow (Assegno di ricerca)
Supervisor: Prof. Dario Bruzzone

Project and optimization of a full-green ship: hydrodynamic assessment of a non-conventional SWATH like hull via CFD techniques and study of an hybrid/electrical propulsion system aimed at the reduction of the coastal and environmental impact.

[Grant funded by Regione Liguria, PO CRO Fondo Sociale Europeo Regione Liguria 2007-2013 Asse IV “Capitale Umano” ob. specifico I/6]

Work scope:

- Conceptual and Preliminary design of the vessel.
- Hydrodynamic design and optimization of the submerged hull.
- Optimization of the on board arrangements.
- Preliminary design of the propulsion system.
- Drawing of the lines plan, the general arrangements, the main section.

January 2012 – December 2012, University of Genoa, DYNATECH
Supervisor: Prof. Stefano Brizzolara

Project and Optimization of a New Hydro-Oceanographic Vessel (NIOM).

[Project commissioned by Italian Navy, in cooperation with CETENA, INSEAN and University of Naples. Studi Di Risk Reduction – Attività a supporto dello Stato Maggiore Marina nel settore della progettazione navale e simulazione numerica di operazioni di messa a mare e recupero mezzi in condizioni meteomarine avverse” vengono svolte a fronte del Contratto N° 20040 di rep. in data 29/12/2010]

Work scope:

- Creation of parametric model of the vessel using the *Friendship-Framework* software.
- Comparative analysis of possible benefits of different types of bulbs.
- Optimization of hull shapes with respect to wave resistance and seakeeping by means of a genetic algorithm.
- Critical analysis of results.
- Drawings of the lines plan of some designs.
- Written report of results.

March 2012 – October 2012, University of Genoa, DICCA
Supervisor: Prof. Enrico Rizzuto

Creation of a software based procedure for the selection of the main parameters of a fleet of ship for Compressed Natural Gas (CNG) trade.

[Project commissioned by RINA (Registro Italiano Navale)]

Work scope:

- Development of the software for the generation and selection of different fleets of ships for a specific CNG trade.
- Statistical analysis of structures, propulsion systems and outfitting of existing ship.
- Creation of CAD models of two ships.
- Analysis of the calm water and added resistance of the two model ships.
- Validation and application of the numerical procedure.

January 2011 – July 2011, University of Genoa, DINAEL

Supervisor: Prof. Stefano Brizzolara

Hydrodynamic Design and Assessment by CFD Methods Of a Hybrid SWATH(Small Waterplane Area Twin Hull) / Hydrofoil USV (Unmanned Surface Vehicle) for a Super High Speed.

[Project commissioned by US ONRG (United States Office of Naval Research Global), grant N62909-10-1-7116]

Work scope:

- Development of a Non-Linear Lifting Line Method for hydrofoils operating in both non-cavitating and super-cavitating conditions.
- Application of the numerical method for the project, the optimization and the analysis of a supercavitating hydrofoil.
- Validation of the method by means of experimental tests (carried out at the Free Surface Cavitation Tunnel of the Technical University of Berlin).
- Creation and optimization of the parametric model of the hull of the vessel with respect to wave resistance.

August 2010 – March 2011, NURC (NATO Underwater Research Center), La Spezia

Supervisor: Prof. Stefano Brizzolara

Hydrodynamic design and optimization of an innovative SWATH-USV by CFD methods.

[Project commissioned by NURC (NATO Underwater Research Center)]

Work scope:

- Creation of the parametric model of the SWATH.
- Optimization with respect to wave resistance.

May 2010 – July 2010, University of Genoa, DINA V

Supervisor: Prof. Stefano Brizzolara

Optimization of hull shape and engines systems for military applications at high speeds.

[Project commissioned by Italian Navy, in collaboration with CETENA]

Work scope:

- Creation of parametric model of three different mono-hulls.
- Optimization of two of them with respect to wave resistance and seakeeping by means of both genetic and evolutionary algorithms.
- Validation by means of towing tank tests at the model basin of the University of Genoa.
- Critical analysis of results.
- Drawings of the lines plan of some designs.

Teaching Activities

March 2017 – June 2017, University of Genoa

Teaching Assistant (TA) of the class “*Ship Dynamic – Naval Architecture II*” (for graduate students).

September 2016 – December 2016, University of Genoa

Teaching Assistant (TA) of the class “*Naval Architecture I*” (for undergraduate students).

March 2016 – June 2016, University of Genoa

Teaching Assistant (TA) of the class “*Ship Dynamic – Naval Architecture II*” (for graduate students).

January 2014 – February 2014, Massachusetts Institute of Technology (MIT)

Teaching Assistant (TA) of the Independent Activity Period (IAP) class for credit subject 2.S980, Graduate Special Subject in Mechanical Engineering, “*Splash into Numerical Hydrodynamics*” (for graduate and PhD students).

October 2013, Massachusetts Institute of Technology (MIT)

Invited lecturer at the class 2.703 Principles of Naval Ship Design (Mechanical Engineering, Fall Semester 2013 – for graduate students).

1st lecture: Basics of optimization in Engineering.

2nd lecture: Hull Parametric Modeling for Hydrodynamic Optimization.

September 2012 – December 2012, University of Genoa

Teaching Assistant (TA) of the class “*Geometry of the Ships*” (for undergraduate students).

April 2012 – August 2012, FORMA Institute, Chiavari

Math professor.

September 2011 – December 2011, University of Genoa

Teaching Assistant (TA) of the class “*Geometry of the Ships*” (for undergraduate students).

September 2010 – December 2010, University of Genoa

Teaching Assistant (TA) of the class “*Geometry of Ships*” (for undergraduate students).

Thesis Supervisor

From November 2015, University of Genoa, DITEN

1. “Estensione alla soluzione dei moti della nave di un metodo 3D BEM open source con funzione di Green”. MSc Thesis. Supervisor. Candidate: Niccolo Zanarini. Score: 110/110 *cum laude*.
2. “Logistical Simulations for Optimal CNG Fleet Design”. MSc Thesis. Supervisor. Candidate: Parodi Marco. Score: 110/110.
3. “Development of a Numerical Method for the Performance Prediction of Dihedral and Cambered Stepped Planing Hulls”. MSc Thesis. Supervisor. Candidate: Gioffre Agostino. Score: 106/110.
4. “Analysis of Free Form Deformation Technique for Hydrodynamic Ship Optimization”. MSc Thesis. Supervisor. Candidate: Pasquinucci Carlo Augusto. Score: 106/110.
5. “Implementation of Rule compliance criteria and preliminary strength verifications in an automatic CNG fleet design framework”. MSc Thesis. Supervisor. Candidate: Beomonte Pietro. Score: 104/110.
6. “Seakeeping analysis of fast multi-hull vessels advancing in waves”. MSc Thesis. Supervisor. Candidate: Claudio Maria Apollonio. Score: 110/110 *cum laude*.

7. “Study and application of a Smoothed Particle Hydrodynamic (SPH) solver to strongly non-linear free surface problems”. MSc Thesis. Supervisor. Candidate: Papetti Aldo. Expected: February 2017.

8. “Free Form Deformation and Subdivision Surfaces for Intelligent Ship Modeling and Optimization”. MSc Thesis. Supervisor. Candidate: Coppedè Antonio. Expected: October 2017.

March 2013 – May 2014, University of Genoa

Supervisor of all B.Eng. degree thesis for lines plan creation (about 100 undergraduate students).

September 2011 – September 2012, University of Genoa

Supervisor of all B.Eng. degree thesis for lines plan creation (about 100 undergraduate students).

September 2011 – March 2012

“Design of a 30 feet catamaran with hydrofoils and a rigid wing-sail”. MSc Thesis. Assistant Supervisor.

July 2011 – December 2011

“Interactive solution of potential flow and boundary layer over 2D airfoils including accurate trailing edge separation bubble modeling”. MSc Thesis. Assistant Supervisor.

Education

January 2009 – December 2011, University of Genoa

PhD. on Numerical Marine Hydrodynamics

Dissertation on the 20th April 2012, on “Parametric Hydrodynamic Optimization of Ship Hull Forms based on CFD Techniques: Theory and Application” (in English)

Supervisor: Prof. Ing. Stefano Brizzolara

30/06/2014 – 04/07/2014, Wolf Dynamics & University of Genoa

“Introduction to OpenFOAM for Marine Application” – training course on modeling and simulating marine flows with the software *OpenFOAM*

25/07/2013 – 26/07/2013, CD-ADAPCO

“Virtual Towing Tank” – online intensive training course on modeling and simulating marine flows with the software *Star-CCM+*

6/09/2010 – 17/09/2010, CINECA, Bologna

XIX Summer School on Parallel Calculus

16/03/2010 – 18/03/2010, CILEA, Milan

Advanced course on *Fortran Programming for Scientific Calculus*

2005 –2008, University of Genoa

M.Sc. Degree in Naval Engineer

Dissertation on “A Vortex Lattice Method for the Aerodynamic Analysis of Upwind Sails”

Marks awarded: 107/110

Supervisor: Prof. Ing. Stefano Brizzolara

January 2006 – December 2006, IIS (International Institute of Welding), Genoa
Course for *International Welding Engineer* (IAB-002-2000/EFW-409)

January 2006 – December 2006, London School of English, Chiavari
First Certificate in English

2002 – 2005, University of Genoa
B.Eng. Degree in Naval Engineer
Dissertation on “Complete Project of a Product-Carrier”
Marks awarded: 100/110
Supervisor: Prof. Ing. Carlo Podenzana Bonvino

List of Publications

International Journals:

Angelini R.R., Vernengo G., Brizzolara S. and Guercio, R. *Identification of Smoothed Particle Hydrodynamic Model Parameters for Stable Wave Propagation by Optimization Technique*. Under review for publication in the Journal of Environmental Modeling and Software (Elsevier).

JO Royset, L Bonfiglio, G Vernengo, S Brizzolara. *Set-Based Approach to Design Under Uncertainty and Applications to Shaping a Hydrofoil*. Under review for publication in the Journal of Mechanical Design of the American Society of Mechanical Engineers (ASME).

Vernengo, G., Bonfiglio, L., Brizzolara, S. *Super-Cavitating 3D Hydrofoil Analysis by Viscous Lifting Line Approach*. Under review for publication in the AIAA Journal of the American Institute of the Aeronautics and Astronautics.

Vernengo, G., & Brizzolara, S. (2017). *Numerical investigation on the hydrodynamic performance of fast SWATHs with optimum canted struts arrangements*. *Applied Ocean Research*, 63, 76-89.

Vernengo, G., Bonfiglio, L., Gaggero, S., & Brizzolara, S. (2016). *Physics-Based Design by Optimization of Unconventional Supercavitating Hydrofoils*. *Journal of Ship Research*, 60(4), 187-202.

Vernengo, G., Gaggero, T., & Rizzuto, E. (2016). *Simulation based design of a fleet of ships under power and capacity variations*. *Applied Ocean Research*, 61, 1-15.

Vernengo, G., & Bruzzone, D. (2016). *Resistance and seakeeping numerical performance analyses of a semi-small waterplane area twin hull at medium to high speeds*. *Journal of Marine Science and Application*, Springer, 15, 1-7.

Brizzolara, S., & Vernengo, G. (2016). *A three-dimensional vortex method for the hydrodynamic solution of planing cambered dihedral surfaces*. *Engineering Analysis with Boundary Elements*, Elsevier, (63), 15-29.

Gaiotti, M., Rizzo, C. M., Rizzuto, E., & Vernengo, G. (2016). *Material selection for the gas containment system of a compressed natural gas carrier fleet*. Applied Ocean Research, Elsevier, 55, 37-47.

Vernengo G., Brizzolara S., Bruzzone D., 2015. *Resistance and Seakeeping Optimization of a Fast Passenger Ferry*. International Journal of Offshore and Polar Engineering (IJOPE), ISSN: 1053-5381, March issue, 2015.

Vernengo G., Rizzuto E., *Ship Synthesis Model for the Preliminary Design of a Fleet of Compressed Natural Gas Carriers*. Ocean Engineering, vol. 89, 2014, pp. 189–199

Brizzolara S., Curtin T., Bovio M., Vernengo G., *Concept Design and Hydrodynamic Optimization of an Innovative SWATH USV by CFD methods*, Ocean Dynamics Journal, DOI 10.1007/s 10236-011-0471-y, Springer, 2011.

S. Brizzolara, G. Vernengo, *Automatic Optimization Computational Method for Unconventional S.W.A.T.H. Ships Resistance*. International Journal of Mathematical Models and Methods in Applied Science, Issue 5, Volume5, pp 882 – 889, 2011.

International Conferences:

Apollonio, C.M., Vernengo, G., Bonfiglio, L., Brizzolara, S., Bruzzone, D. On the Roll Motion Prediction of High Speed Multi-hull Vessels. Accepted for presentation at the Twenty-seventh (2017) International Ocean and Polar Engineering Conference, San Francisco, CA, USA.

Bonfiglio, L., Gaggero, S., Papetti, A., Vernengo, G., Villa, D. *Systematic Analysis of Mesh and Meshless CFD Methods for Water Impact Problems*. VII International Conference on Computational Methods in Marine Engineering MARINE 2017 M. Visonneau, P. Queutey and D. Le Touze (Eds).

Bonfiglio, L., Vernengo, G., Brizzolara, S., Bruzzone, D. *A hybrid RANSE – strip theory method for prediction of ship motions*. Maritime Technology and Engineering 3 – Guedes Soares & Santos (Eds) © 2016 Taylor & Francis Group, London, ISBN 978-1-138-03000-8

Martelli, M., Vernengo, G., Bruzzone, D. *Overall Efficiency Assessment of a Trawler Propulsion System Based on Hydrodynamic Performance Computations*. Proceedings of the Twenty-sixth (2016) International Ocean and Polar Engineering Conference Rhodes, Greece, June 26-July 1, ISBN 978-1-880653-88-3; ISSN 1098-6189

Altosole, M., Figari, M., Ferrari, A., Bruzzone, D., Vernengo, G. *Experimental and Numerical Investigation of Draught and Trim Effects on the Energy Efficiency of a Displacement Mono-Hull*. Proceedings of the Twenty-sixth (2016) International Ocean and Polar Engineering Conference Rhodes, Greece, June 26-July 1, ISBN 978-1-880653-88-3; ISSN 1098-6189.

Brizzolara S., Vernengo G., Bonfiglio L., Bruzzone D. (2015). *Comparative Performance of Optimum High Speed SWATH and Semi-SWATH in Calm Water and in Waves*. Word Maritime Technology Conference (WMTC), November 3-7, 2015, Providence, Rhode Island. **Selected for publication in the Transaction SNAME.**

S. Brizzolara, G. Vernengo, C.A. Pasquinucci, S. Harries (2015). *Significance of Parametric Hull Form Definition on Hydrodynamic Performance Optimization*. VI International Conference on Computational Methods in Marine Engineering (Marine 2015), 15-17 June 2015, Rome, Italy.

Agno E., Vernengo G., Bruzzone D. (2014). *Seakeeping and added resistance of a fast Semi-SWATH ship*. Accepted to be presented at the 9th International Conference on High Performance Marine Vehicles (HIPER) Athens War Museum, Athens, Greece 3-5 December 2014.

Vernengo G., Brizzolara S. (2014). *Vortex Lattice Method for Steady Hydrodynamic Analysis of Cambered Planing Surfaces*. 4th Chesapeake Power Boat Symposium June 23rd – 24th, 2014, St. John's College, Annapolis, Maryland, USA

Vernengo G., Brizzolara S., Bruzzone D., 2014. *Hydrodynamic Design of a Fast Semi-SWATH Passenger Ship for Littoral Applications: an Automatic Parametric Optimization Approach*. 24th International Ocean and Polar Engineering Conference (ISOPE 2014). BEXCO, Busan, Korea, June 15th - June 20th, 2014.

G. Vernengo, T. Gaggero, E. Rizzuto, *Integration of added resistance evaluations in a ship synthesis model*, 12th International Symposium on Practical Design of Ships and Other Floating Structures (PRADS2013), 20-25 October, 2013, CECO, Changwon City, Korea.

P. Giribone, R. Revetri, A. Testa, G. Vernengo, E. Rizzuto, R. Longo, A. Lo Nigro, *A simulation Based Methodology for Supporting CNG Ship Design*, Proceedings of the 7th International Conference on Applied Mathematics, Simulation and Modelling (ASM '13), January 30th– February 1st, Cambridge, MA, USA.

G. Vernengo, E. Rizzuto, R. Longo, A. Lo Nigro, *A procedure for the preliminary selection of the main characteristics of a fleet of ships for a given trade*. NAV12 conference, October 17-19, 2012, Naples.

G. Vernengo, S. Brizzolara, *A Reformulated Lifting Line Theory for Supercavitating Hydrofoil Design*. Proceedings of the 8th International Symposium on Cavitation, CAV2012, August 14-16, 2012, Singapore.

S. Brizzolara, G. Vernengo et al. *Design and optimization of a family of hybrid USV-SWATH*. FAST Conference 2011. Honolulu, Hawaii.

S. Brizzolara, M. Viviani, G. Vernengo et al. *Automatic Hull Form Optimization of Fast Naval Vessel*. FAST Conference 2011. Honolulu, Hawaii.

G. Vernengo, S. Brizzolara, *Automatic Computer Driven Optimization of Innovative Hull Forms for Marine Vehicles*, ACACOS Conference 2011. Venice, Italy.

Brizzolara, S. Vernengo, G. Bovio, M. 2010. *Hydrodynamic Design and Optimization of an innovative SWATH-USV by CFD methods*. MREA Conference, Lerici, Italy.

Biliotti, I. Brizzolara, S. Vernengo, G. et al. 2010. *Automatic Parametric Hull Form Optimization in the Context of the Preliminary Ship Design*. Proceedings HIPER Conference 2010, pag. 261-273, Melbourne, Florida.

G. Vernengo, I. Biliotti, S. Brizzolara, M. Viviani 2010. *Parametrization and Optimization of Round Bilge and Deep-V Frigate Hull Types for Resistance and Seakeeping*. European Users Meeting & Conference 2010, Potsdam, Germany.

Vernengo G., Biliotti I., Brizzolara S., Viviani M., Ruscelli D., Bonvicini A., Galliussi M., Manfredini A., 2009. *Influence of Form Parameters Selection on the Hull Surface Shape Control for Hydrodynamic Design*. International Conference on Ships and Shipping Research (NAV 2009), Messina, Italy.

Vernengo G., Brizzolara S., 2009. *Application of a Vortex Lattice Method to the analysis of sail plans in upwind condition*. International Congress of the International Maritime Association of the Mediterranean (IMAM 2009), Istanbul, Turkey.

Invited speeches:

Design by Optimization of Ship Hull Forms. New perspectives through full parametric modeling and multi-objective optimization. modeFRONTIER International Users Meeting, 12th-13th May, 2014, Trieste, Italy.

Actual Tools and Methods for Marine Design. Conference organized by the Italian Navy and the ATENA association, December 2012, La Spezia, Italy.

Languages

<i>Italian</i>	Native.
<i>English</i>	Fluent.
<i>French</i>	Basic.

14/03/2017

