



SMART
MARITIME

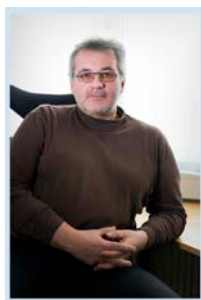
THE PHD/POSTDOC PROGRAMME AND ITS CONTRIBUTION TO THE CLUSTER

June 20, 2023 – Trondheim

Stein Ove Erikstad, NTNU

sfi = Centre for
Research-based
Innovation

The Research Council of Norway



Renato Skejic
Postdoc WP2 (2016–2018)



Eshan Esmailian
PhD student WP2 (2019–2022)



Lokukaluge Prasad Perera
Postdoc WP2/WP3 (2015–2017)



Torstein Ingebrigtsen Bø
Postdoc WP3 (2015–2017))



Yuan Tian
PhD Candidate WP3 (2021–2023)



Prateek Gupta
PhD student WP2 (2018–2021)



WP 2
Hull and propeller optimization



Jørgen B. Nielsen
PhD student WP3/WP4 (2015–2018)



Jarle Kramer
PhD Candidate WP2



WP 3
Power systems and fuel



John Martin Kleven Godø
PhD student WP2 (2015–2018)



Dražen Polić
Post Doc researcher WP 2 (2020–2022)



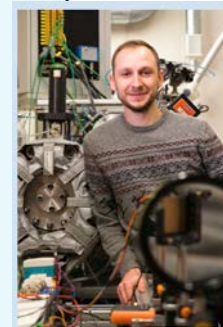
Jon Coll Mossige
PhD student WP2 (2017–2020)
Supervisor: Lars Erik Holmedal (NTNU)



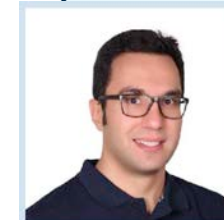
Endre Sandvik
PhD student WP4 (2016–2019)



WP 4
Ship system integration and validation



Vladimir Krivopolianskii
PhD student WP3/WP4 (2015–2018)



Kamyar Maleki
PhD student WP3 (2019–2022)



Siamak Karimi
PhD student WP3 (2019–2022)



Marius Ulla Hatlehol
PhD Candidate WP3 (2020–2023)



Benjamin Lagemann
PhD student WP4 (2019–2022)

Hydrodynamics of hydrofoil vessels

- Flying Foil - develop and commercialize a new generation of hydrofoil vessels for use in passenger transport



**John Martin Kleven
Godø**

PhD student WP2 (2015–2018)

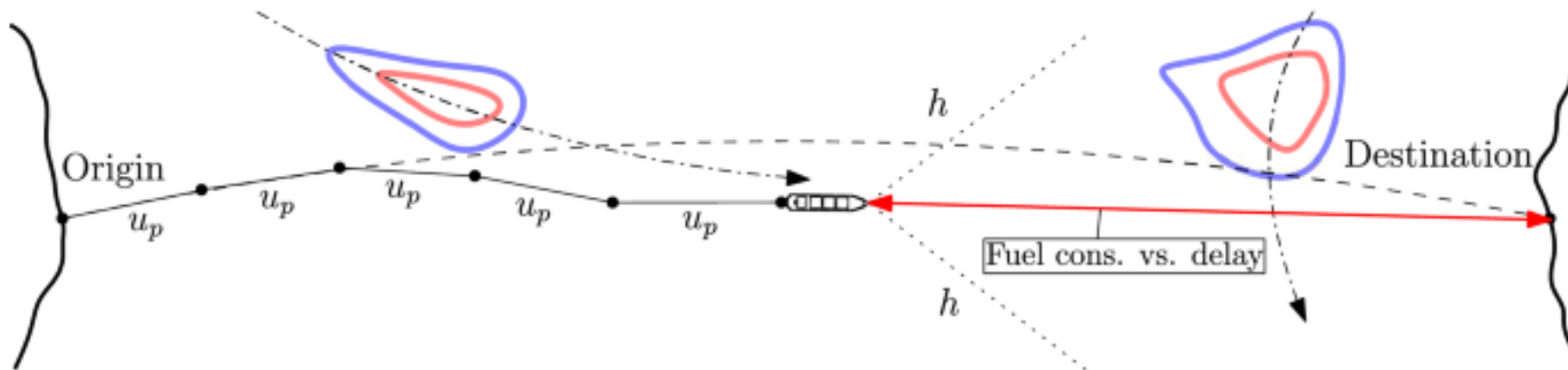
Simulation-based design

- Using simulations to virtually test designs in operational scenarios
- Routing vessels taking future sea states into consideration



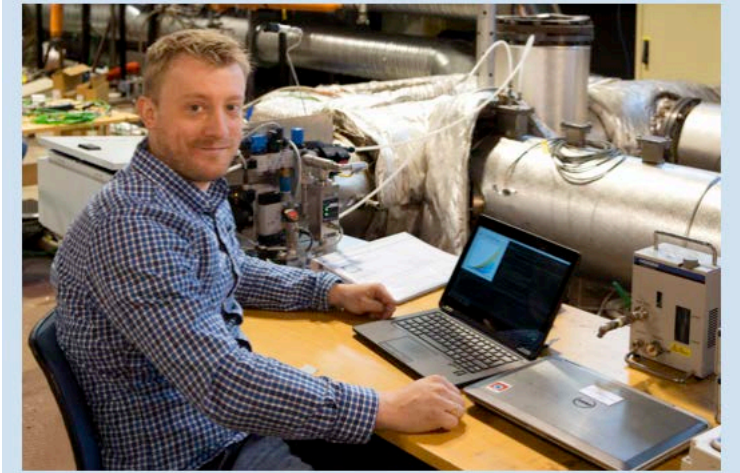
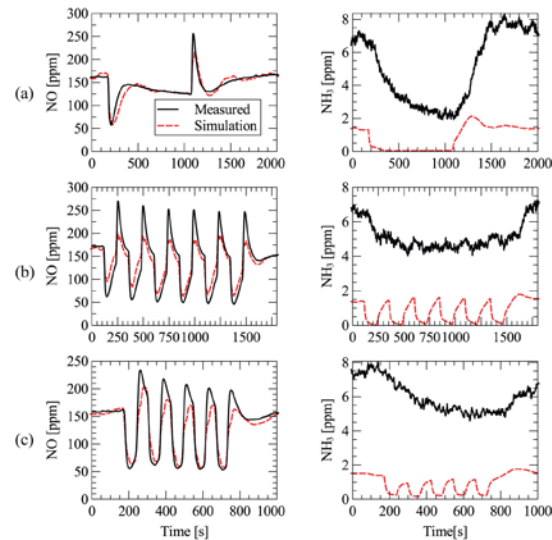
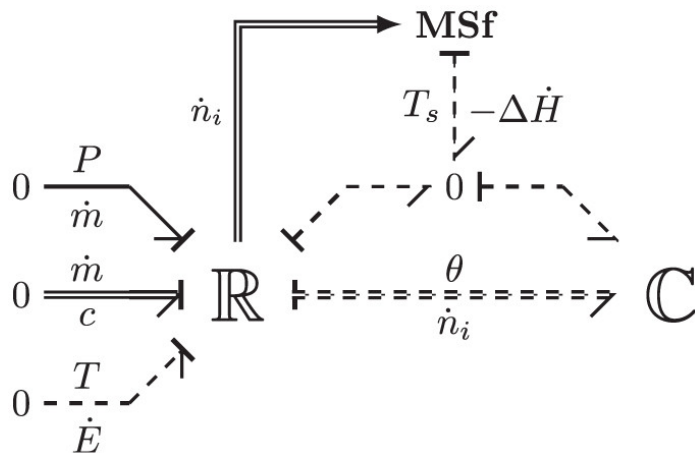
Endre Sandvik

PhD student WP4 (2016-2019)



System Simulation

- Improve energy utilization in marine power systems with hybrid power technology and energy harvesting
- A system approach to modelling heat exchanger and heat exchanger network dynamics using bond graphs.

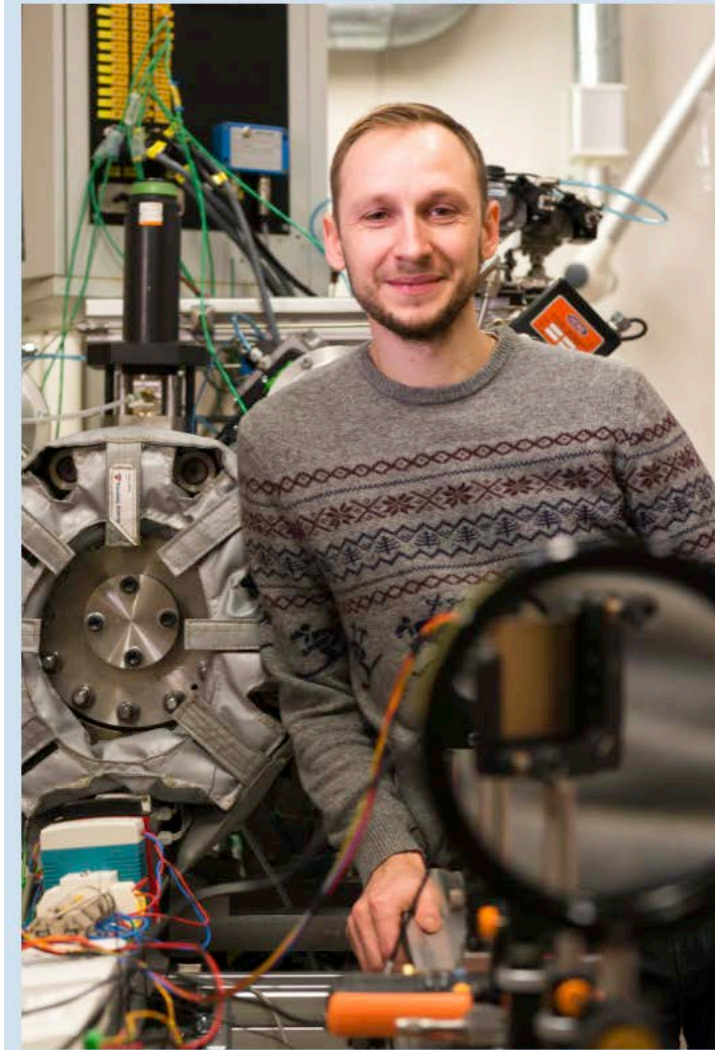


Jørgen B. Nielsen

PhD student WP3/WP4 (2015–2018)

Fuel injection and combustion

- Develop an experimental setup for fundamental study of the emission from alternative fuels' combustion
- Develop facility and experimental research methods for marine engine injection valves and combustion process of both liquid and gaseous fuels



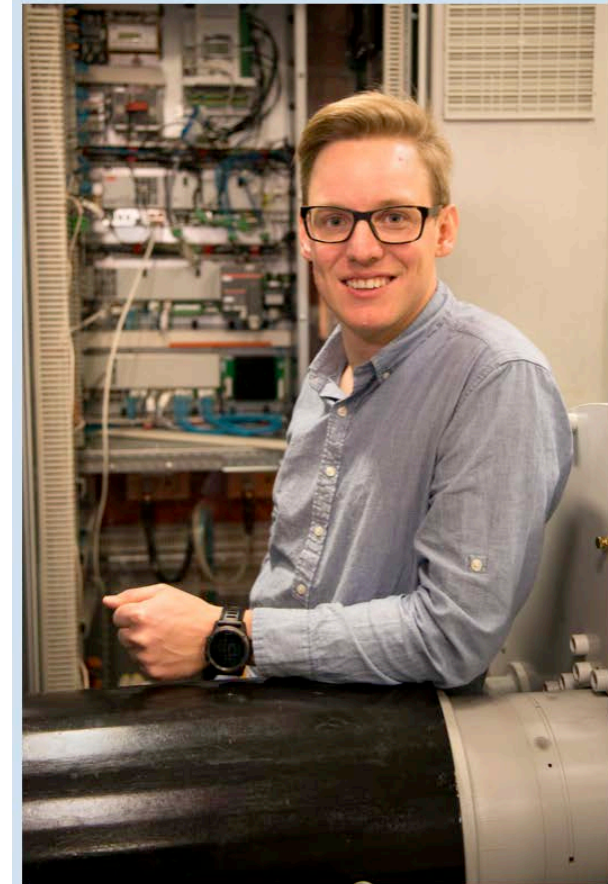
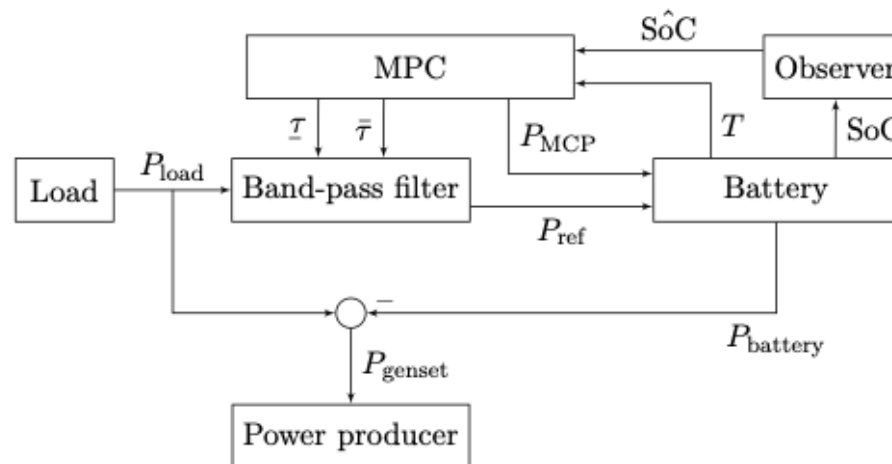
**Vladimir
Krivopolianskii**

PhD student WP3/WP4 (2015–2018)

Hybrid propulsion

Models of marine electric power plants suitable for design and optimisation of propulsion systems

- A scenario-based model predictive controller (MPC)
- A method to control peak-shaving
- The vessel itself as energy storage during DP operation



**Torstein
Ingebrigtsen Bø**

Postdoc WP3 (2015-2017))

Data handling framework for ship performance and navigation monitoring

A machine learning-based data handling framework for ship performance and navigation monitoring

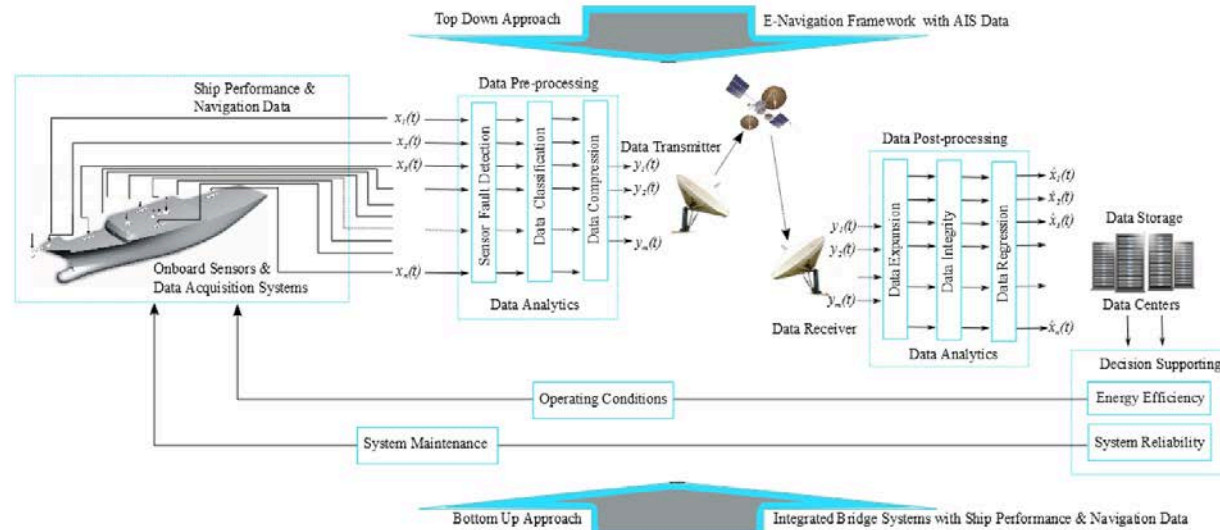


Figure 1. Data handling framework

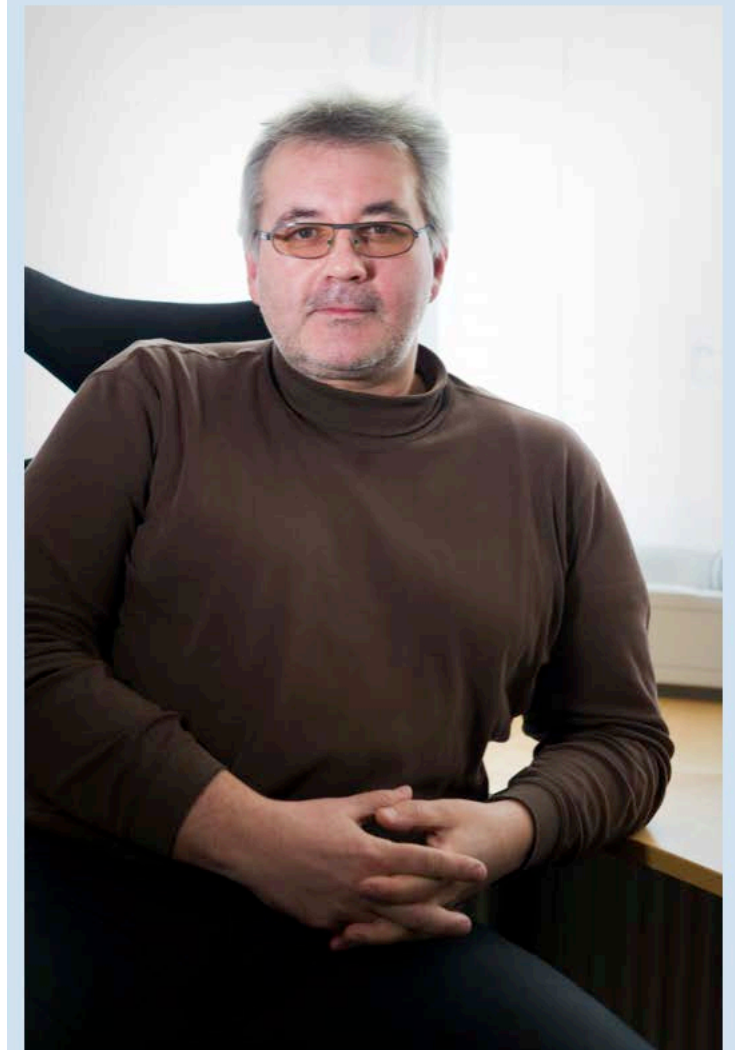


Lokukaluge Prasad Perera

Postdoc WP2/WP3 (2015–2017)

Added resistance due to waves

- Medium-fidelity computational methods for added resistance due to waves
- Potential flow methods that are less complicated, faster and more robust than full 3-D non-linear panel methods



Renato Skejic

Postdoc WP2 (2016–2018)

Friction resistance

Numerical investigation of roughness effects on the turbulent boundary layer for a flat plate

- Improve prediction methods for power requirement and fuel consumption of full scale ships
- Design of new hull coating technologies with better performance



Jon Coll Mossige

PhD student WP2 (2017–2020)

Supervisor: Lars Erik Holmedal
(NTNU)

Hydrodynamic modelling of wind-powered merchant vessels

- Sails models in a route simulation framework using both a discrete lifting line method and a Vortex Lattice Method.
- Modelling wing-to-wing interaction which are seen to strongly affect both the thrust and the side force from sails

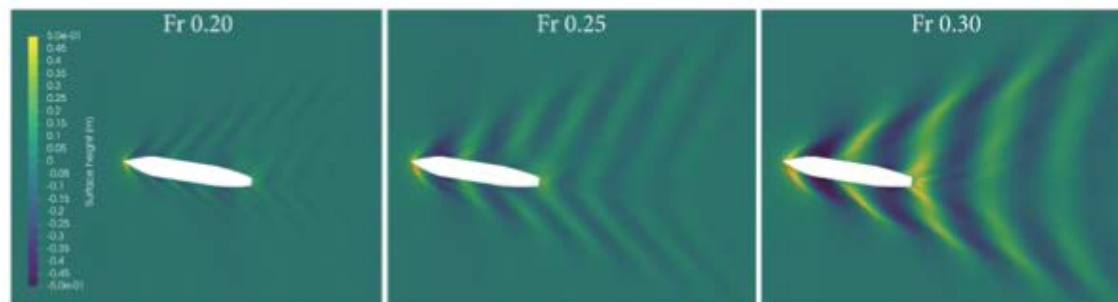
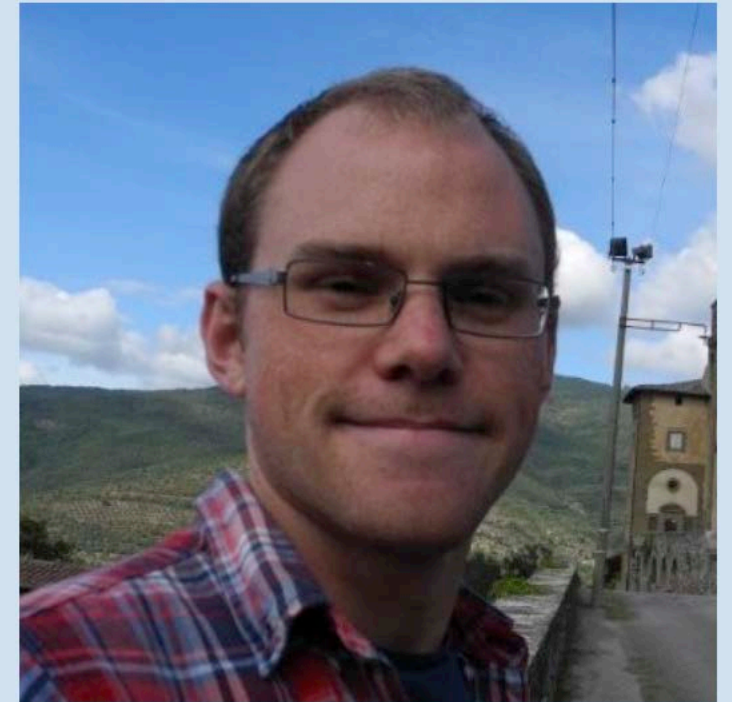


Fig. 13. Waves generated by the ship while moving with 9 degrees drift, for different Froude numbers. Model scale 1:4.

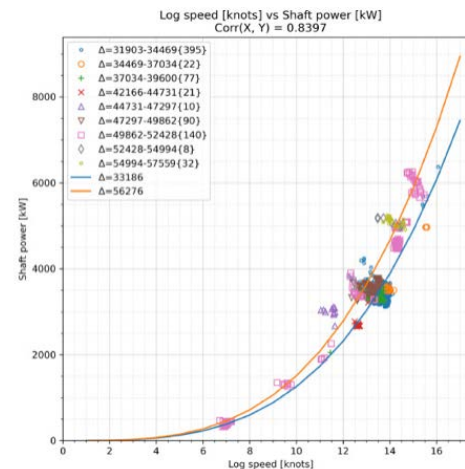
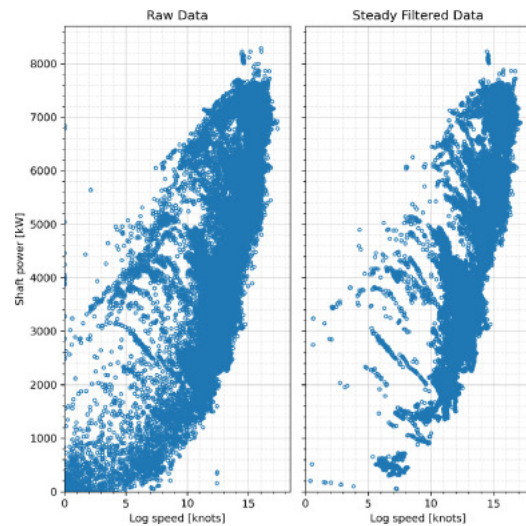


Jarle Kramer

PhD Candidate WP2

Ship Performance Monitoring using In-service Measurements and Big Data Analysis Methods

- Convert the highly dimensional in-service measurement data recorded onboard a ship into meaningful information



Prateek Gupta

PhD student WP2 (2018–2021)

Design for operation in real sea states

More practical, accurate and efficient methods for ship design and optimization in real seaways

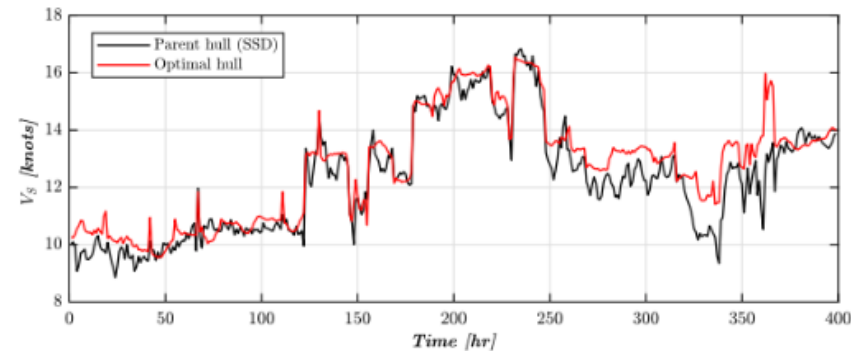
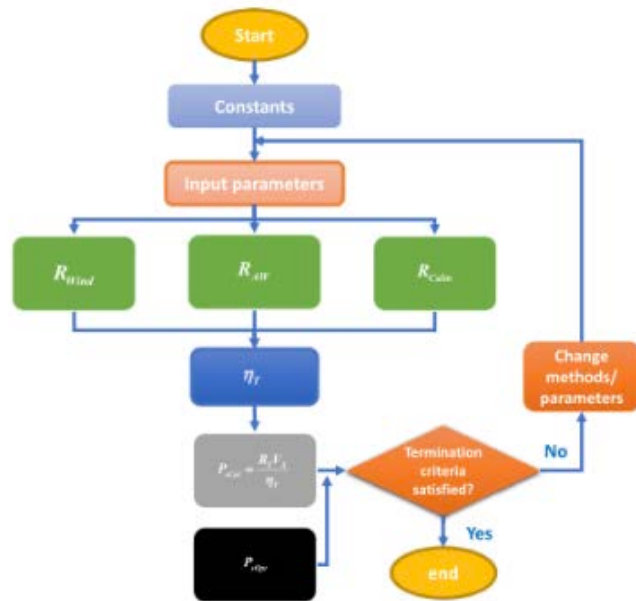


Fig. 18. Comparison of the attainable ship speed across different cases.



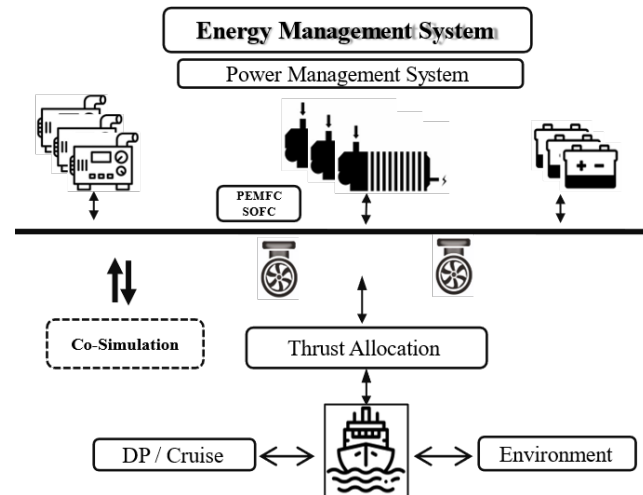
Eshan Esmailian

PhD student WP2 (2019–2022)

Optimization of Marine Power Plants

Fuel cell system models for the marine sector

- Bond Graph of Proton Exchange Membrane Fuel Cell System
- Dynamic Modelling of PEM Fuel Cell System for Simulation
- System-Level Modeling of Plant with PEMFC System and Battery
- Co-simulation of Hybrid Power Plant for an Offshore Vessel
- Simulation of Ammonia SOFC for Offshore Supply Vessel



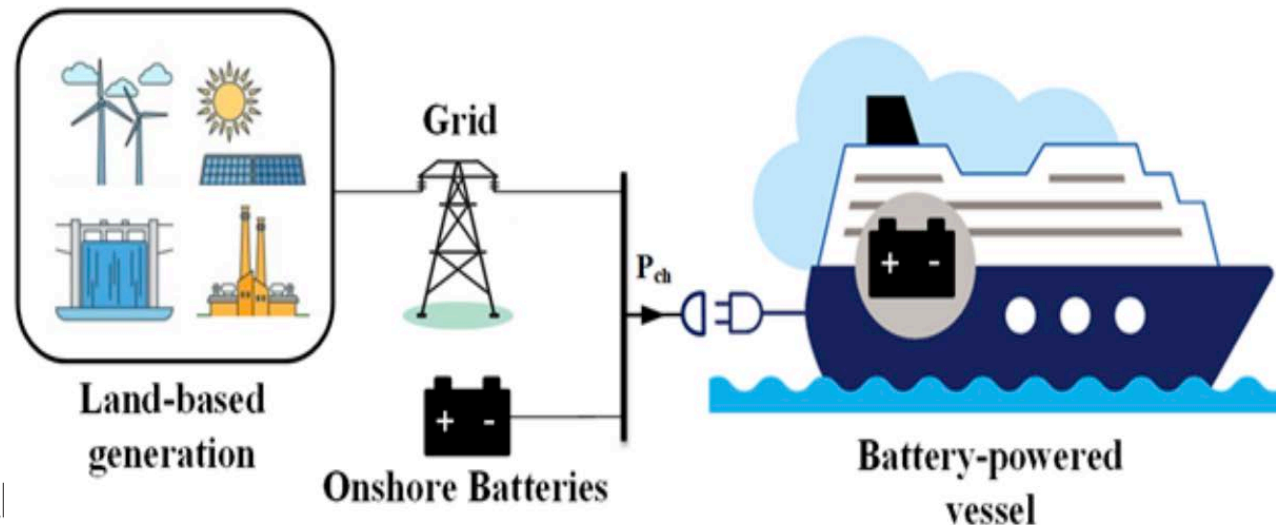
Kamyar Maleki

PhD student WP3 (2019–2022)

Shore to ship charging systems for all-electric and plug-in hybrid ships

Power system architecture for shore-to-ship charging systems (S2SCS)

- Energy efficiency
- Reliability
- Control and operation management

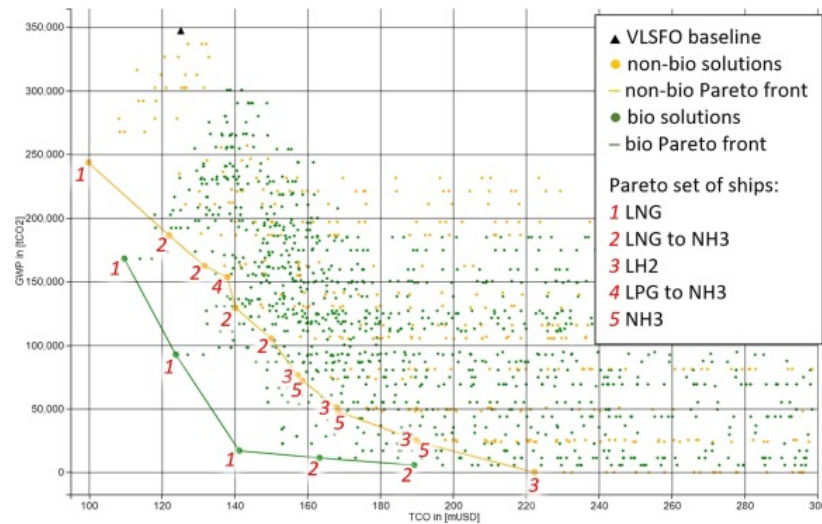
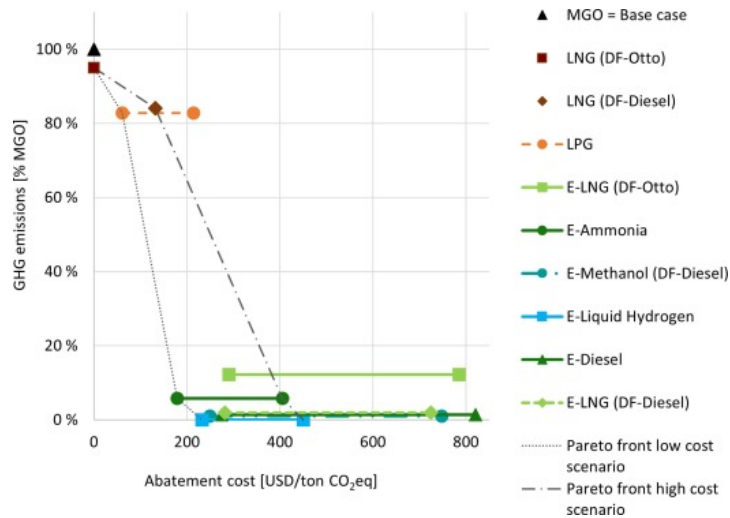


Siamak Karimi

PhD student WP3 (2019–2022)

Conceptual ship design

- Optimal ship lifetime fuel and power system selection
- Reduction of maritime GHG emissions and the potential role of E-fuels

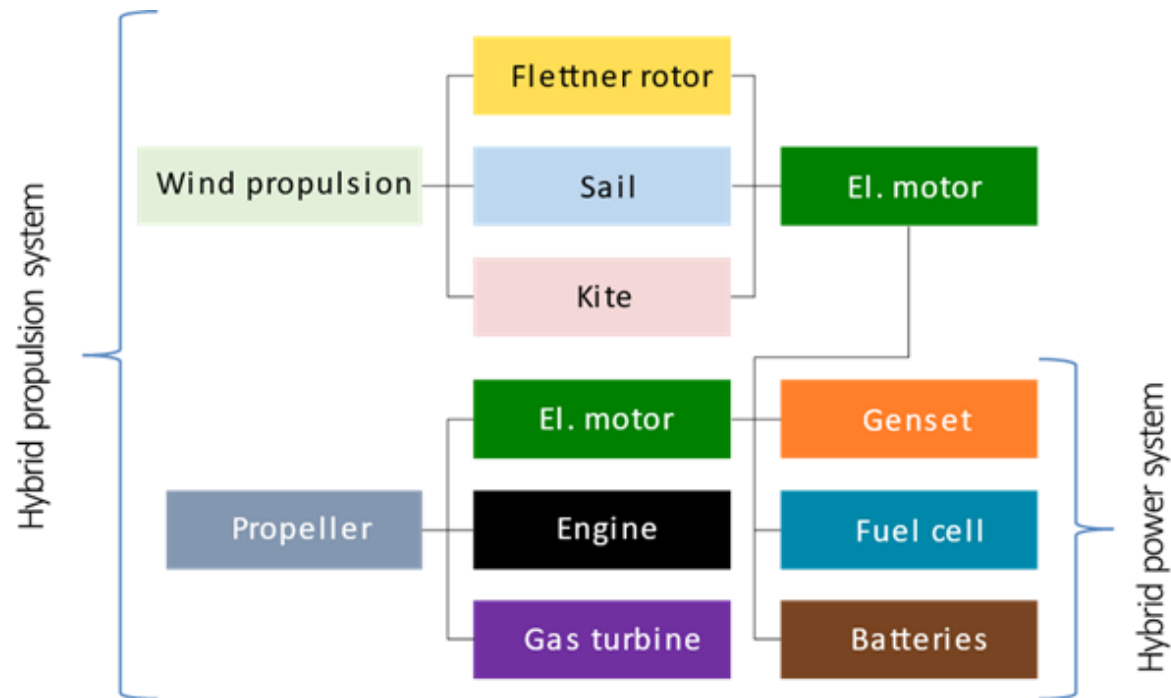


Benjamin Lagemann

PhD student WP4 (2019–2022)

Feasibility of wind propulsion

- Impact of wind propulsion on the propeller and power system

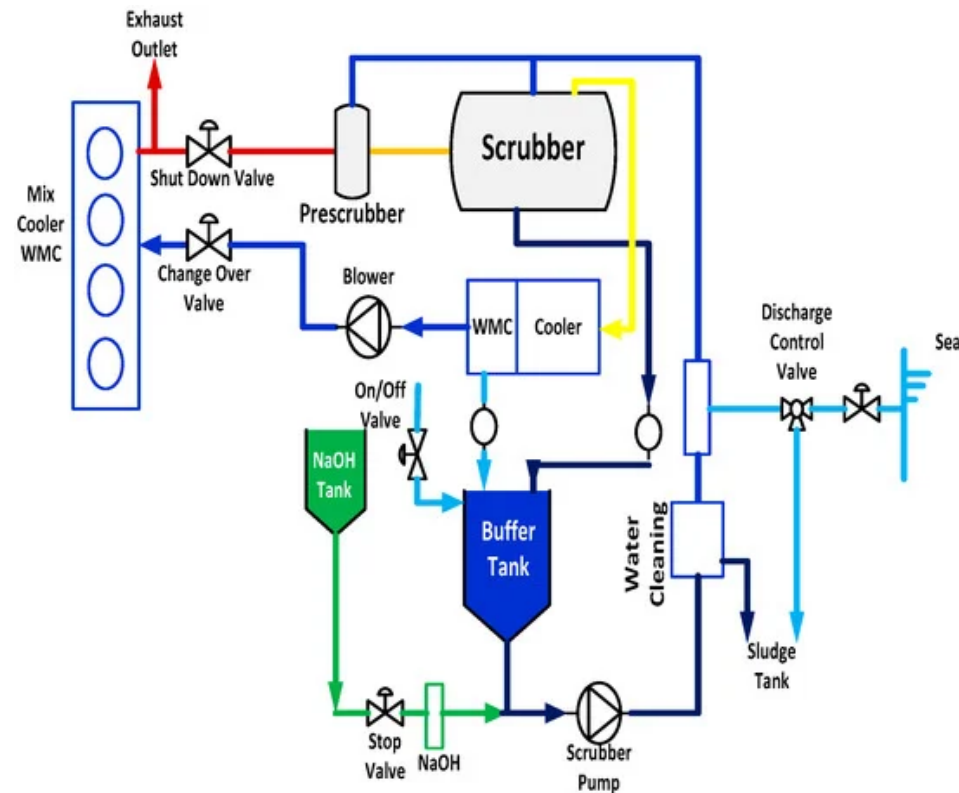


Dražen Polić

Post Doc researcher WP 2 (2020–2022)

Modeling and simulation of marine exhaust gas cleaning system

- How to reduce ship emissions more effectively by investigating ship exhaust gas cleaning systems

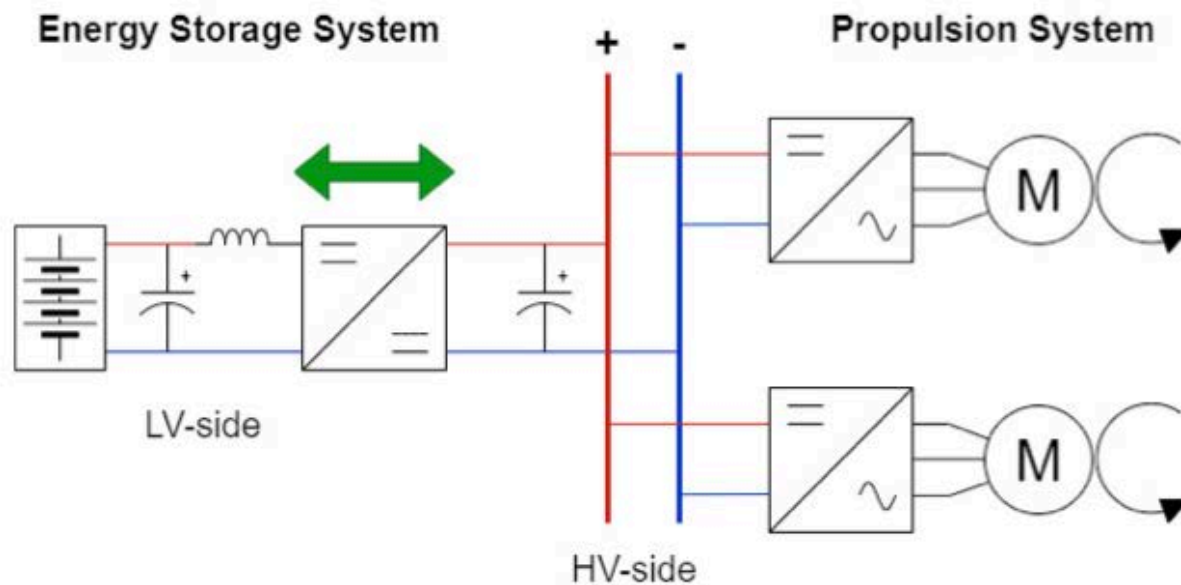


Yuan Tian

PhD Candidate WP3 (2021–2023)

Hybrid Electric Power and Propulsion

Modeling, Design and Control of Hybrid Electric Power and Propulsion for Future Low-Emission and Autonomous Vessels



**Marius Ulla
Hatlehol**

PhD Candidate WP3 (2020–2023)

MSc projects

- Many MSc projects related to the SFI
- Various degrees of industry involvement
- MSc's are an important "dissemination channel"



PhD and PostDocs - IMPACT

- They develop research results to be implemented by industry
- Many employed in industry and SINTEF after finishing, contributing to increased competency and R&D capability
- They are imperative for research-based education at NTNU, and the level of quality of our 120+ candidates every year
- PhDs and PostDocs are important for developing strong research communities in Norway in close collaboration with SINTEF and industry

Can we do even better – in an FME?

- Better industry involvement in PhDs and PostDocs?
 - Problem development? Industry hosting? Industry PhDs? Cases?
- Closer integration between NTNU and SINTEF?
- More extensive MSc involvement
 - Start earlier? MSc more involved in activities? Internships/hosting?

Thanks

