Activities related to the safety of maritime transportation at Faculty of Navigation

Jakub Montewka

PA Safe meeting, Gdynia 9th of November, 2017

Structure of the Faculty - chairs

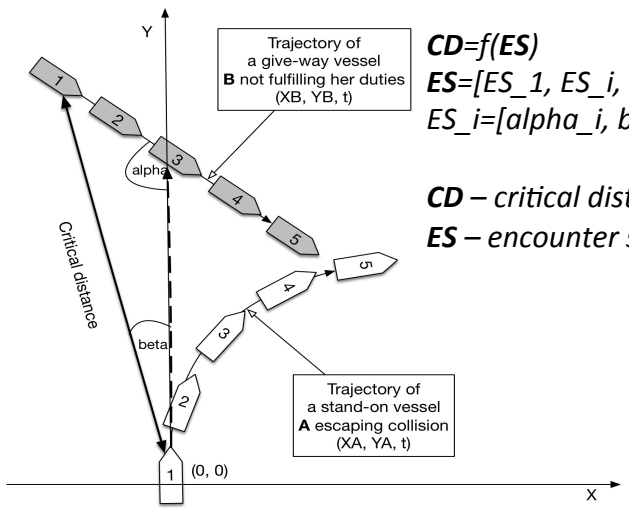
1. Navigation
2. Ship operations
3. Geodesy and oceanography
4. Transport and Logistics
5. Mathematics

Research areas

Safety and risk of maritime transportation systems including autonomous shipping

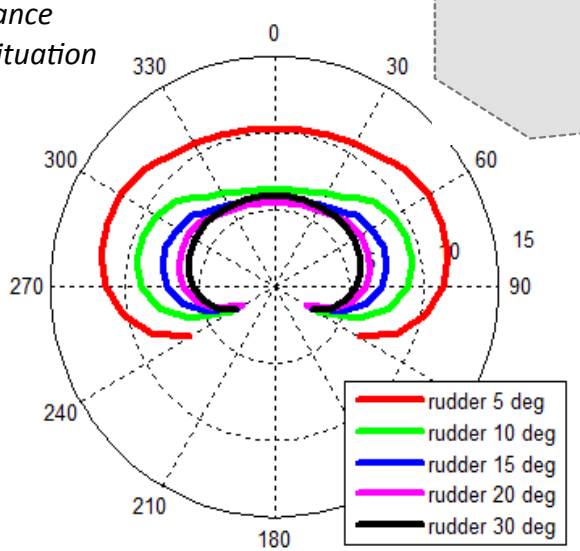
Jakub Montewka, associate professor

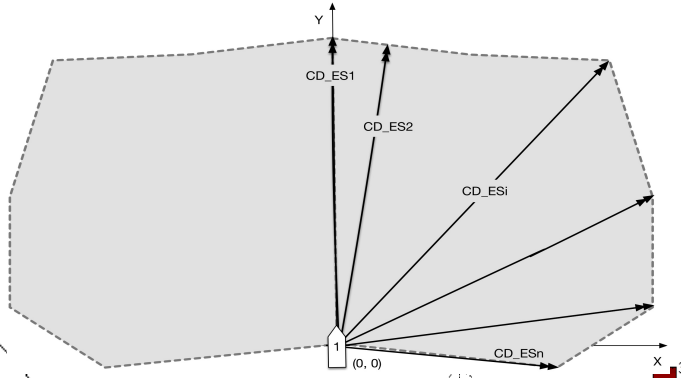
- The assessment of critical area in a collision encounter accounting for stability conditions of a ship

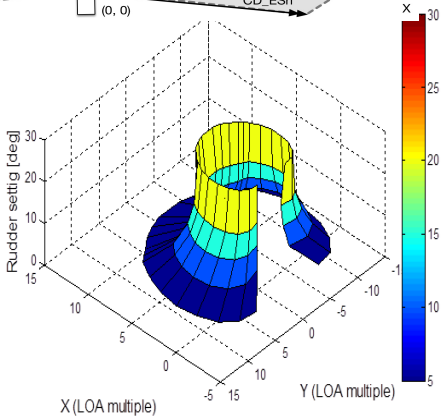


***CD**=f(**ES**)*
***ES**=[ES_1, ES_i, …, ES_n]*
ES_i=[alpha_i, beta_i, manoev_i, rudder_i]

***CD** – critical distance*
***ES** – encounter situation*







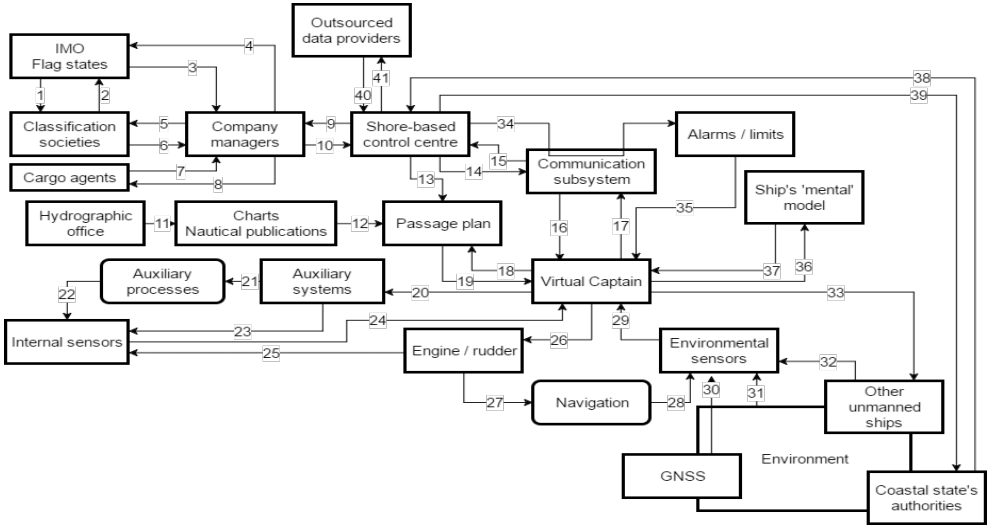
Krata, P., & Montewka, J. (2015). Assessment of a critical area for a give-way ship in a collision encounter. The Archives of Transport, 34(2), 51–60.

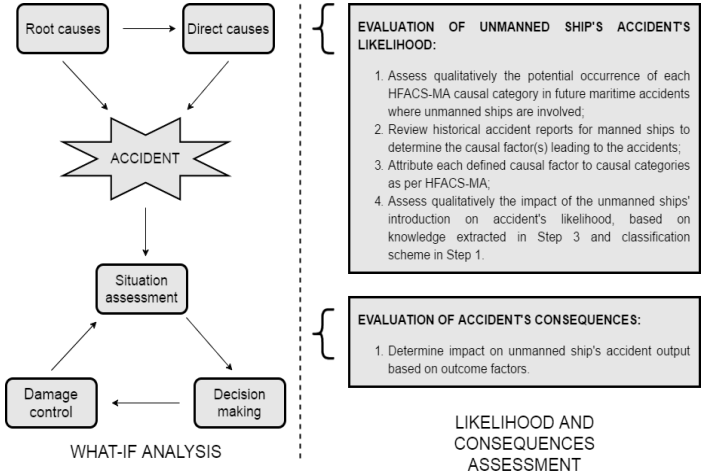
Research areas

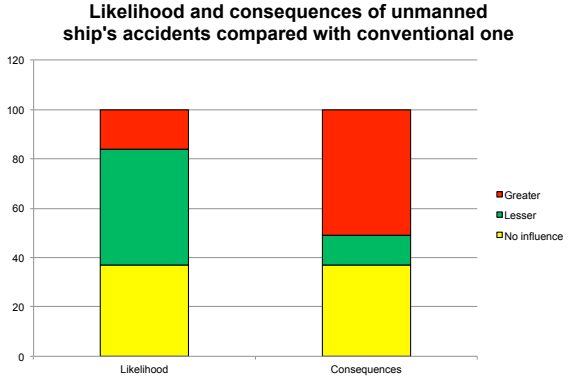
Safety and risk of maritime transportation systems including autonomous shipping

Jakub Montewka, associate professor

- What-if analysis of autonomous vessel safety
- Safety control structure for the proces of high-sea navigation of an autonomous merchant vessel
- Uncertainty assessment of the developed model







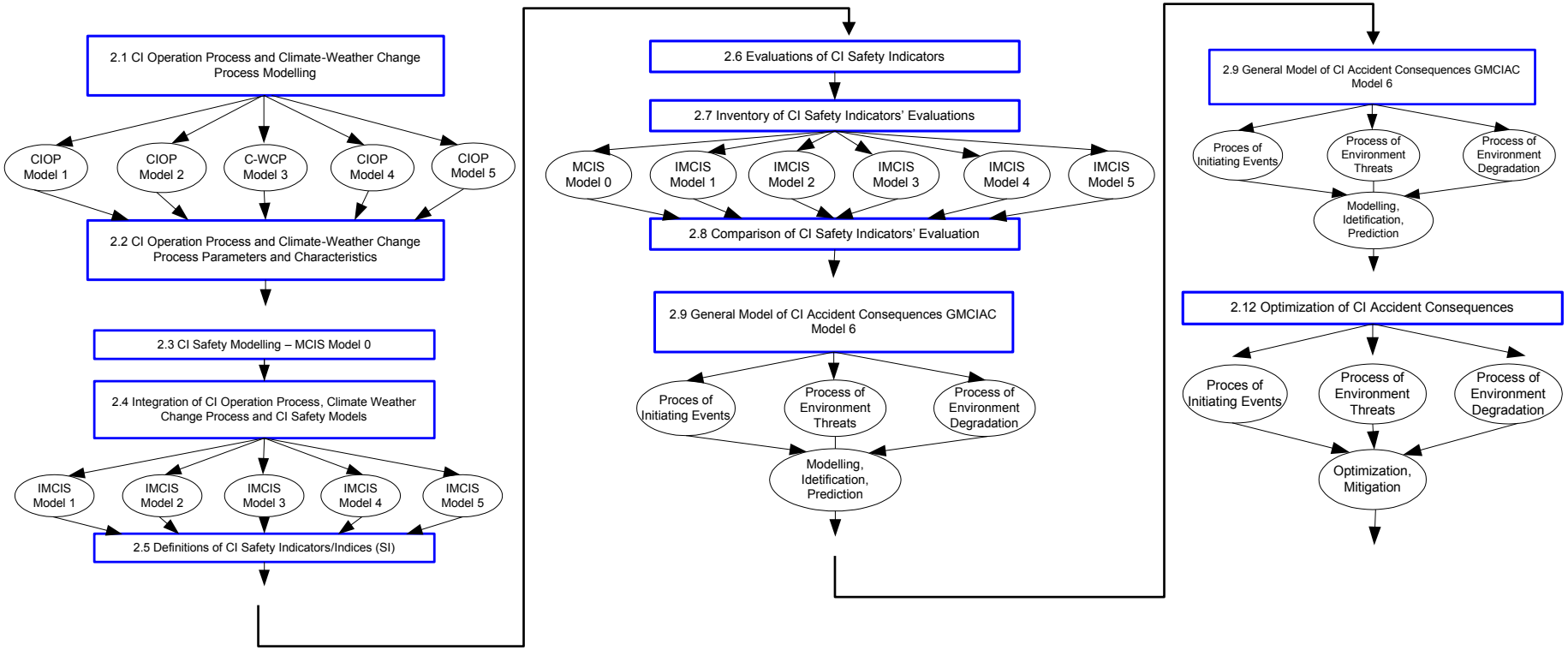
K. Wróbel, J. Montewka, and P. Kujala, "Towards the assessment of potential impact of unmanned vessels on maritime transportation safety," Reliab. Eng. Syst. Saf., vol. 165, no. September, pp. 155–169, 2017.

Research areas

Critical Infrastructure (CI) safety and resilience

Krzysztof Kołowrocki, professor

- Modelling the operational threats and extreme weather hazards on safety of CI
- Development of CI safety and resilience indicators.

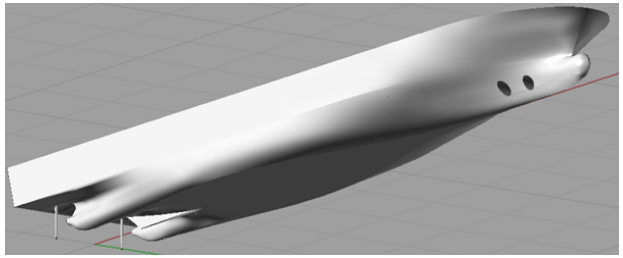


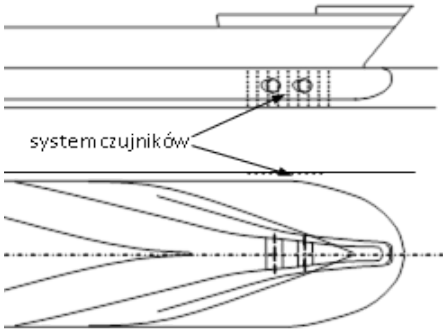
Research areas

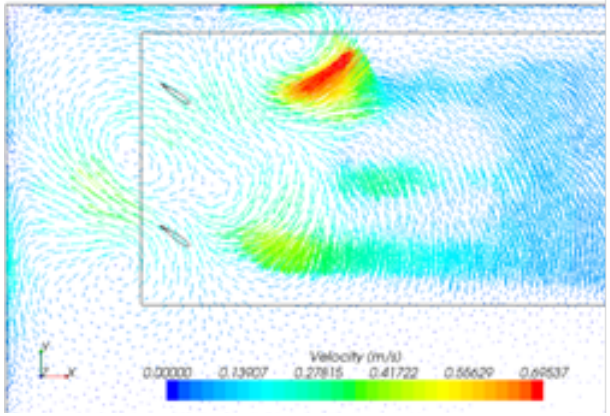
Ship-shore interaction monitoring, modelling and assessment

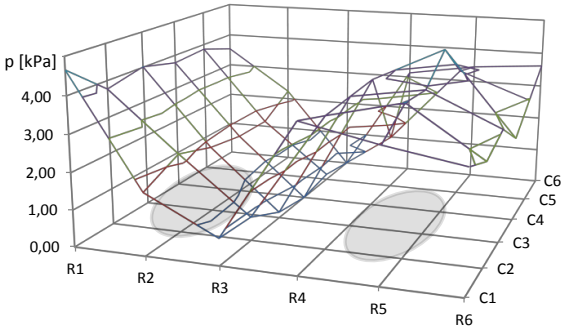
Teresa Abramowicz-Gerigk, associate professor

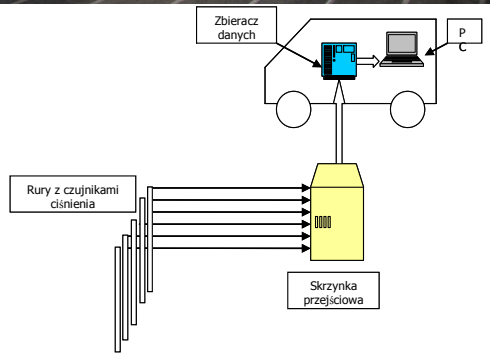
- Identification of degradation processes of seabed protection in ports
- CFD model of the velocity field generated by propellers during unberthing manoeuvers
- Full-scale measurement in port of Gdynia











Research areas

Ship-shore interaction monitoring, modelling and assessment

Teresa Abramowicz-Gerigk, associate professor

Fundusze Europejskie
Program Regionalny

URZĄD MARSZAŁKOWSKI
WOJEWÓDZTWA POMORSKIEGO

Unia Europejska
Europejskie Fundusze
Strukturalne i Inwestycyjne

System for monitoring loads
induced by vessels
on the quay wall and bed protection

Projekt pt.:*„Stworzenie prototypu systemu monitorowania obciążeń nabrzeży i umocnień dna w rejonie cumowania statków wraz z wdrożeniem na rynek gotowego produktu przez firmę Enamor Sp. z o.o. z Gdyni*

Oś priorytetowa 01. Komercjalizacja wiedzy,
Działanie 01.01. Ekspansja przez innowacje,
Poddziałanie 01.01.01. Ekspansja przez innowacje – wsparcie dotacyjne

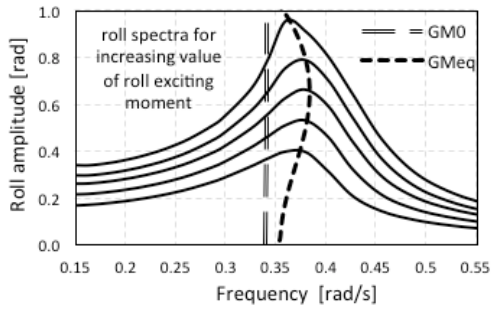
1

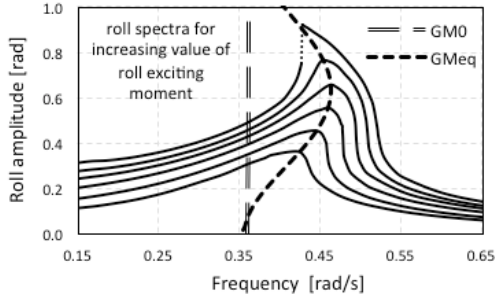
Research areas

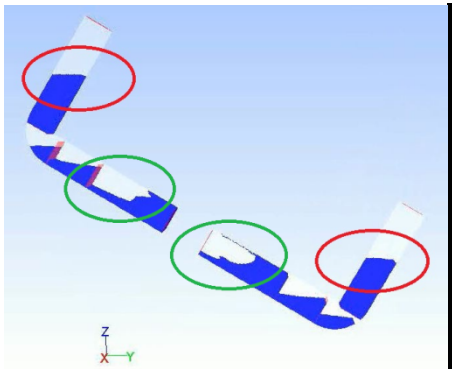
Ship-shore interaction monitoring, modelling and assessment

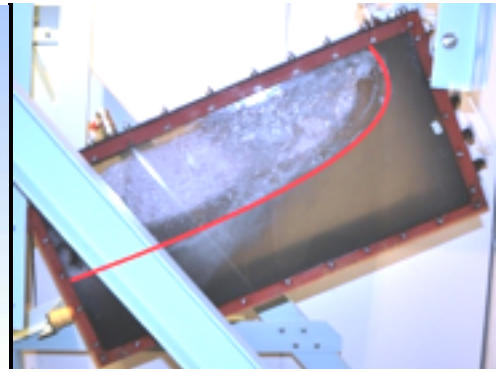
Przemysław Krata, assistant professor

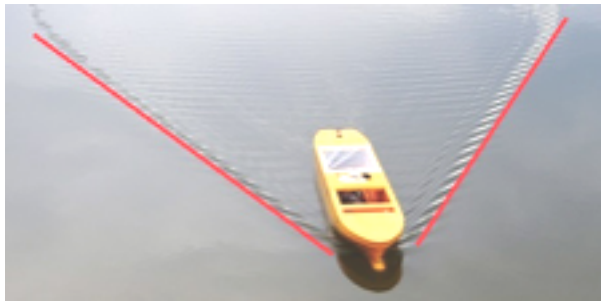
- Modeling of ship rolling with special regard to resonant modes of this motion
- Modeling of liquid sloshing phenomenon taking place in partly filled ship's tanks
- Estimation of ship squat and other hydrodynamic phenomena with the use of CFD technique

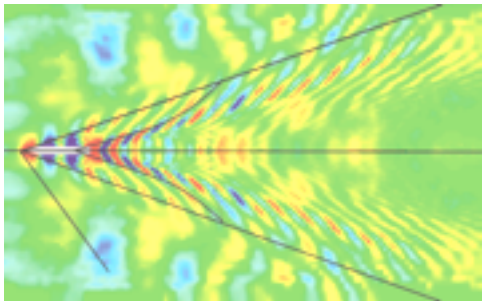










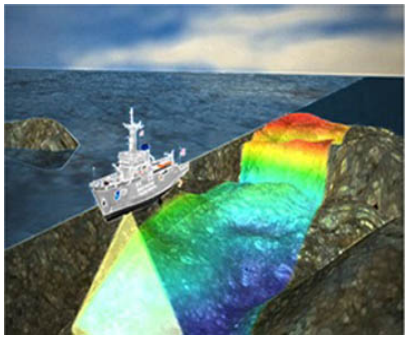


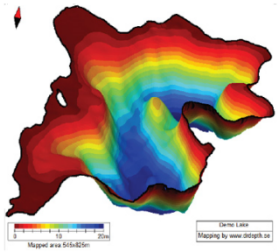
Research areas

Hydrographic and land survey and modelling

Cezary Specht, professor

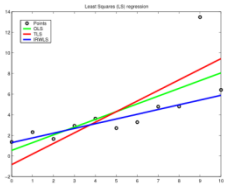
- Hydrographic survey of sea and inland waterways, bathymetric models development
- Laser scanning of railways for the purpose of planning new lines and diagnostic of existing
- Geo-spatial data visualisation, analysis and modelling
- Assessment of operational characteristics of GNSS (GPS, GLONASS, Galileo, BeiDou)

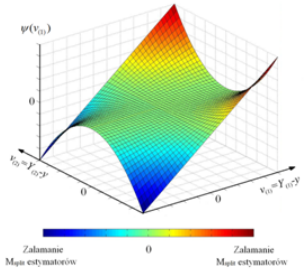


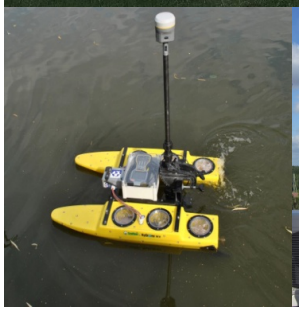


$$\rho(\mathbf{y};\mathbf{X}) = \sum_{i=1}^{n} \hat{p}_i v_i^2 = \mathbf{v}^T \hat{\mathbf{P}} \mathbf{v} = \min_{\mathbf{X}}$$

$$w(\bar{v}_i) = \begin{cases} p_i & dla \quad |\bar{v}_i| \le k \\ \exp(-l\,|\bar{v}_i - k|^2)\, p_i & dla \quad |\bar{v}_i| > k \end{cases}$$







Thank you for your attention

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