Zachodniopomorski Uniwersytet Technologiczny w Szczecinie

West Pomeranian University of Technology, Szczecin

Faculty of Maritime Technology and Transport Department of Ship Structure, Mechanics and Fabrication



Presentation of various aspects related to the third semester of EMSHIP at ZUT in Szczecin



Prof. Zbigniew Sekulski

EMSHIP Vice Local Coordinator









http://nssdc.gsfc.nasa.gov/planetary/image/earth_day.jpg



Zbigniew Sekulski, ZUT, Szczecin

EMship

Nantes, February 2015





Who is the most significant Polish person in the history?

Nicolaus Copernicus (Polish: **Mikołaj Kopernik**) (born in 19 February 1473, died on 24 May 1543) was a Renaissance mathematician and astronomer who formulated a model of the universe that placed the Sun rather than the Earth at its center.

The publication of this model in his book *De revolutionibus orbium coelestium* (*On the Revolutions of the Celestial Spheres*) just before his death in 1543 is considered a major event in the history of science, triggering the Copernican Revolution and making an important contribution to the Scientific Revolution.







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Faculty of Maritime Technology and Transport



Zachodniopomorski Uniwersytet Technologiczny w Szczecinie

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Advanced ship and offshore structural mechanics

Ultimate strength: nonlinear finite element analysis: review of theory and applications to ship structures, FEA guidelines for ship modelling, linear and non linear analysis, static and dynamic analysis; strength of ship structures subject to impact loads.

$$\int_{V} \rho N_{mq} N_{mp} \mathrm{d}V \left[\ddot{d}_{q} + \left[\int_{V} D_{kl} B_{lq} B_{kp} \mathrm{d}V \right] d_{q} = \int_{A} p_{m} N_{mp} \mathrm{d}A + \int_{V} b_{m} N_{mp} \mathrm{d}V \right]$$





Fatigue and fracture: fundamentals of the fracture mechanics, mechanisms of fatigue failure, methods of fatigue analysis: nominal stress approach, hotspot stress approach, notch stress approach, long-term stress distributions.

$$N\Delta\sigma^{m} = \frac{1}{C_{0}\left(\sqrt{\pi^{m}}\right)} \int_{a_{0}}^{a_{t}} \frac{\mathrm{d}a}{\left(Y\sqrt{a}\right)^{m}}$$







Advanced ship and offshore structural mechanics

Structural reliability and risk assessment:

Uncertainties, limit state, failure modes, first and second order reliability methods, safety indices, uncertainties in ship structural design, integration of reliability concepts (loads



and strength) in calculation of ship structures (rule based approaches and direct calculations). $S_1 = \Phi(-\beta) \prod_{j=1}^{n-1} (1-\beta\kappa_j)^{-0.5}$

$$S_{2} = \left[\beta \Phi(-\beta) - \varphi(\beta) \right] \left\{ \prod_{j=1}^{n-1} \left(1 - \beta \kappa_{j} \right)^{-0.5} - \prod_{j=1}^{n-1} \left[1 - (\beta + 1) \kappa_{j} \right]^{-0.5} \right\}$$
$$S_{3} = (\beta + 1) \left[\beta \Phi(-\beta) - \varphi(\beta) \right] \left\{ \prod_{j=1}^{n-1} \left(1 - \beta \kappa_{j} \right)^{-0.5} - \operatorname{Re} \prod_{j=1}^{n-1} \left[1 - (\beta + i) \kappa_{j} \right]^{-0.5} \right\}$$





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Advanced ship and offshore structural design





Main characteristics and design objectives of various ship types (passenger ships, bulk-carrier, containership, chemical tanker, liquefied gas tanker, ro-ro, ropax, etc.), use of new materials in the construction of specific ship types (metallic and nonmetallic materials, sandwich and core structures), structural arrangement of these specific ship types, loads and strength of these specific ship types, structural details of these specific ship types, IMO conventions and classification societies rules requirements of these specific ship types.







Advanced ship and offshore structural design



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EMship





Advanced ship and offshore production technology



Technology of building of specific ship types, technology of building ships supporting offshore industry, technology of building offshore floating steel and concrete structures, application and manufacturing technology using innovative sandwich structures to ship hull, non-conventional methods of ship launching, underwater technology – fabrication and application of manned and unmanned vehicles.







EMSHIP – lectures at ZUT

12/25



- DNV Software:
 - GeniE
 - PreFEM
 - Sesam
 - Sestra
 - WaveShip
 - Nauticus Hull
- Poseidon
- Aveva (Tribon)









TABLE CALLER COMPANY AND STORE SHE S









Internship / Thesis



Andrey Smolko

Structural response of the ship hull elements subject to excitation generated by the main engine





Structural Design of Helicopter Landing Platform on Offshore Ship





Wai Lin Tun







Internship / Thesis

Calculation of Fuel Consumption and Exhaust Emissions from Ship in Ice Conditions







Duong Quang Tan



Investigation of the hull-superstructure interaction in order to predict the contribution of superstructures to hull girder strength





Jiawei Zou









Gdańsk Shipyard

Structural design of Platform Supply Vessel less than 90m



Hailemariam Desalegn Eltiro

Analysis and prediction of welding deformations of ship panels in prefabrication process

Huggo S. Batista









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Internship / Thesis



Arnaud Le Pivain

Pillars definition and dimensionning, Verification and Validation of FEM parametric model



Yue Wu

Concept Design of a Station Keeping Vessel Dedicated to Maintenance of the Far Shore Wind Farm





Universidade Federal do Rio de Janeiro

Rasih Onur Suzen

Discrete Event Simulation Helps to Improve Terminal Productivity for New Design Container Ships











Prabu Duplex

Novel application of large area propeller to optimize Energy Efficiency Design Index (EEDI) of ships



DNV·GL

Md Rezaul Karim

Fatigue Analysis of Offshore Drilling Unit









DNV·GL

DNV-GL Group, Gdynia:

• Fatigue calculations analysis of floating drilling platform.

Crist Shipyard, Gdynia:

Analysis of manufacturing process with respect to automation and mechanization of welding of ship structures.

Finomar Shipyard, Szczecin:

• Technology of ship hull building.

Marine Repair Yard GRYFIA:

- Analysis of structural strength of floating dock,
- Structural design of icebreakers modifications.

Ship Research Centre, Gdańsk:

- Thermal/fatigue finite element analysis of structural strength of ship hull elements,
- Experimental investigation of hydrodynamic properties of ships.

Groot Ship Design Poland, Szczecin:

• An investigation into damaged ship stability.

Westcon Design Poland, Szczecin:

• Structural design of a PSV.

Marine Teknikk, Szczecin:

• Structural safety analysis of tankers/containers/bulk carriers/offshore oil rigs in a view of accidents.

Interocean-metal Joint Organization, Szczecin:

Preliminary and structural design of a mining ship.



EMship





Gdańsk Shipyard











Internships abroad are possible!



http://nssdc.gsfc.nasa.gov/planetary/image/earth_day.jpg



Zbigniew Sekulski, ZUT, Szczecin

EMship

Nantes, February 2015





Szczecinie

Practical aspects - orientation

20/25













Single room – 490 PLN (120 €) / month







Practical aspects - prices





Lunch : 10 – 20 PLN (2.5 – 5 €)



Entrance ticket: 10 – 50 PLN (2.5 – 12 €)



1 €≈ 4,20 PLN



A beer: 3 – 6 PLN (0.75 – 1.5 €)









Initial fee: 20 zł Minimal fee: 10 zł

From 0 to the 20th minute: 0 zł From the 21th to the 60th minute: 1 zł From the 61th to 120th minute: 3 zł From the 121th to the 180th minute: 5 zł Each subsequent hour: 7 zł



https://www.bikes-srm.pl















Why not coming to Szczecin ???





EMsh Advanced Design



<u>シュチェチン</u> र्सिर्नि? स्चेचिन

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Stettin Щецин Estetino شتاتشین Στετίνο

O¥Cå Cξ∣ 什切青

