Pacific International Maritime Conference (imc 2019)

Sydney, Australia
8-10 October 2019

ISBN: 978-1-7138-0871-8
# TABLE OF CONTENTS

## SESSION 1

**OPPORTUNITIES FOR ENHANCING DEFENCE CAPABILITY GENERATION: THE FOURTH INDUSTRIAL REVOLUTION**

J. Delore, J. Keane, M. Paes, M. Van Den Berg, J. Willbraham, M. Renilson  

1

**DEVELOPING AUSTRALIA'S INDEPENDENT SURFACE COMBATANT DESIGN CAPABILITY - CHALLENGES AND OPTIONS**

L. Catton, D. Shackleton  

14

**WHY SMART SHIP TECHNOLOGY IS THE FUTURE OF THE AUSTRALIAN HIGH SPEED CRAFT INDUSTRY**

M. Van Someren, R. Jackson  

28

## SESSION 2

**SEAWAY LOADS APPLIED TO A FRIGATE BY THE SMOOTHED PARTICLE HYDRODYNAMICS TECHNIQUE**

B. Cartwright, L. Mulcahy, R. Melekers, T. Magoga, S. Aksu, D. McGuckin, M. Renilson  

38

**REAL TIME STRUCTURAL LOADS MONITORING FOR A LARGE HIGH-SPEED WAVE-PIERCING CATAMARAN USING NUMERICAL SIMULATION AND LINEAR REGRESSION**

I. Almallah, J. Lavroff, D. Holloway, B. Shabani, M. Davis  

49

## SESSION 3

**CREATING A SKILLED, SOVEREIGN WORKFORCE FOR SHIPS AND SUBMARINES**

L. Irving  

59

**FORECASTING AUSTRALIAN SHIPBUILDING SKILL DEMAND**

H. McCann, J. Rodgers, M. Kalms  

65

**A FRAMEWORK FOR ASSESSING THE IMPACT OF INTEGRATING NEW EQUIPMENT ONTO NAVAL VESSELS**

L. Webster, B. Morris, D. Dwyer  

80

**MORE EFFICIENT AND FLEXIBLE PROCUREMENT ASSESSMENT WITH A MULTI CRITERIA DECISION ANALYSIS FRAMEWORK**

R. Hayes  

93

## SESSION 4

**FRUSTRATION AND TASK DEVIATION CAUSES ACCIDENTS AT SEA**

A. Rajapakse, G. Emele, M. Lutzhoft, M. Grech  

105

**ASSESSING THE DETERMINANTS OF SAFETY CULTURE IN THE MARITIME INDUSTRY**

D. Andrei, M. Grech, M. Griffin, A. Neal  

120

**A HUMAN CENTRED APPROACH TO OPTIMISE HUMAN PERFORMANCE IN COMPLEX MARINE ENVIRONMENTS AND HABITABLE SPACES**

P. Schumacher, S. Banks  

132

**IMPROVING SHIP SAFETY BY INTEGRATING RISK MANAGEMENT INTO THE SMS FRAMEWORK AND TRACKING NEW KEY PERFORMANCE INDICATORS**

S. Williams  

142

## SESSION 5

**NOVEL PLATFORM FOR LITTORAL RESEARCH VESSELS**

K. Goh, K. Hansen, J. Chappell  

155

**DAMEN SHIPYARDS - HARDWARE IN THE LOOP - ADVANCED SIMULATION TECHNOLOGY**

M. Cleijsen  

166
MULTI-VEssel sea state estimation utilising swarm shepherding ................................................. 173
N. Long, D. Sgarioto, M. Garratt, K. Sammut, H. Abbass

Characterising the Southern Ocean and Ross Sea wave climate .................................................. 185
S. Garrett, T. Durrant

SESSION 6

Propulsive efficiency of submarines and surface warships over their operational speed ranges ................................................................. 200
G. Seil, C. Gargan-Shingles, D. Ranmuthugala, M. Renilson

Naval Hybrid power take-off and power take-in solutions - enabling technologies and intricacies of power systems operations ........................................ 210
M. Benatmane

Australia's part in the age of high-efficiency vessels ....................................................................... 225
W. Symington, H. Nguyen, J. Banns

SESSION 7

Titomic Limited .................................................................................................................................. 239
D. Parsonsnon

Effects of multiple simulated weld repair cycles on the mechanical properties of a high strength, quenched and tempered steel ........................................ 242
P. Dissanayaka, K. Carpenter, H. Li, S. Van Duin, Z. Sterjovski, J. Donato, D. Miller, M. Johansson

Functionally seaworthy: how functional alignment of integrated logistic support can deliver improved seaworthiness .............................................. 257

SESSION 8

Experimental propeller performance characterisation behind a towed axisymmetric body .......................................................... 271
A. Conway, C. Kumar, A. Fowler, R. Khan, A. Rolls

Blockage effect on the drag of an axisymmetric underwater body in towing tank tests .................. 283
Y. Huong, Z. Leong, J. Duffy, A. Conway, D. Ranmuthugala, M. Renilson

The influence of sailplane deflection on the nominal wake .................................................................. 296
D. Pook, G. Seil, C. Shingles, D. Ranmuthugala

Simulating flood recovery manoeuvres using a free running submarine model .......................... 307
P. Crossland, P. Marchant

SESSION 10

Analysis of aft-control surface interaction with an axisymmetric underwater vehicle hull ................. 321
D. Kirkby, D. Pook, M. Renilson, D. Ranmuthugala

Identification of a submarine fin-tip vortex using pod analysis ...................................................... 336
Y. Xue, C. Kumar, S. Lee, M. Giacobello, P. Manovski

SESSION 11

Advanced smart escape support system for passenger ship: enhanced intelligence with people detection technologies ........................................... 346
J. Choi, T. Kim, M. Son, C.-S. Yang

Naval assurance ..................................................................................................................................... 359
S. Palm, J. Steward, C. Oldershhausen
THE TECHNICAL DESIGN GAP IN WARSHIP ENVIRONMENT PROTECTION: WHY ‘NEAR ENOUGH’ IS OFTEN BETTER THAN PERFECT
J. Polglaze

SYSTEMS GRAPHING ALGORITHM METHOD FOR SHIP EVACUATION STUDIES
V. Capizzi, R. Marian, P. Campbell

SESSION 12

LITHIUM-ION BATTERY FIRE SUPPRESSION IN SUBMARINE BATTERY COMPARTMENTS
I. Burch, M. Ghiji, G. Gamble, B. Suendermann, P. Joseph, K. Moinuddin, V. Novozhilov

AN OVERVIEW OF THE INTEGRATED PLATFORM PERFORMANCE MODELLING APPROACH USED TO SUPPORT THE FUTURE SUBMARINE PROGRAM
K. Slater, J. Wharington, M. Selvestrel

A PLATFORM-FOCUSED POWER AND ENERGY MODELLING CAPABILITY FOR SUBMARINES
P. Dennis, P. Hield, J. Wharington, K. Slater

A SYSTEM-OF-SYSTEMS FOR AT-SEA EVALUATION OF MODERN SONARS
P. Wren

SESSION 13

DAMAGE ASSESSMENT OF COMPOSITES FOR NAVAL VESSELS SUBJECTED TO EXPLOSIVE EVENTS
A. Gargano, M. Ibrahim, V. Pickerd

A GENERIC WARSHIP MODEL FOR SURVIVABILITY ANALYSIS
A. Woolley, N. Richards

ADDRESSING MILITARY SURVIVABILITY AND SAFETY ASPECTS IN CLASSIFICATION OF NAVAL DESIGN
B. Kristanto, R. Delpizzo

SESSION 14

SUBS IN SCHOOLS: ENGINEERING A RELIABLE DEPTH-CONTROL SYSTEM AND PRESSURE-HULL
C. Harper, A. Swidan, W. Smith

MODEL SUBMARINE SAIL GEOMETRY OPTIMISATION – A NUMERICAL AND EXPERIMENTAL INVESTIGATION
J. Wotherspoon, A. Swidan, W. Smith, A. Osman

TAKING SUB IN SCHOOL TO THE NEXT LEVEL – ACOUSTIC TESTING
S. Buckland, A. Swidan, W. Smith

DESIGN AND BUILD OF A DEVICE TO MEASURE RESISTANCE AND POWER OF MODEL SUBMARINES IN THE SUBMARINES IN SCHOOLS TECHNOLOGY CHALLENGE
S. Von Limont, A. Swidan, A. Osman, W. Smith

SESSION 15

INTEGRATING MARITIME UNMANNED SYSTEMS ONBOARD MINE HUNTERS AT HEART OF STAND-OFF MINE CLEARANCE
A. Penn

THE REGULATORY APPROACH FOR VESSELS CAPABLE OF AUTONOMOUS AND REMOTE CONTROLLED OPERATION
G. Judson, R. Horne

CBRNE ENABLED DRONES – THE STATE OF PLAY AND PROBLEMATIC FUTURE
H. Slack
SESSION 16

REDUCED PROJECT DURATION VIA INTELLIGENT SCHEDULING FOR SUBMARINE PRODUCTION AND MAINTENANCE ................................................................. J. Ciricillo, J. Payne, R. Richards 548

ACCELERATING FAMILIARISATION USING VIRTUAL REALITY AND SELF-DIRECTED LEARNING .................................................................................. P. Houghton 559

THE ARTIFICIAL INTELLIGENCE APPLIED TO CAD/CAM SYSTEMS FOR DESIGNING THE FUTURE NAVAL SHIPS ......................................................... R. Fernandez 569

SESSION 17

INTEGRATING AUTONOMY – MAINTAIN, LAUNCH, EXECUTE AND RECOVER .......................................................... E. Parkin, J. Chilcott 580

THE DETECTION AND TRACKING OF ANTHROPOGENIC ACOUSTIC SOURCES UTILIZING A HYBRID AUTONOMOUS UNDERWATER & SURFACE VEHICLE (AUSV) (DETECTING, LOCATING AND TRACKING ANTHROPOGENIC ACOUSTIC TARGETS) ........................................ N. Trenaman 592

SESSION 18

MITIGATION OF SLAMMING OF CATAMARANS IN WAVES ................................................................. A. Swidan, D. Christophersen, T. Bauer 600

ICE BELT EXTENTS FOR PROTECTION IN WAVES ......................................................................................... A. Marsland, E. Ballard 612

CHARACTERISATION OF MINIATURE PIEZORESISTIVE PRESSURE SENSORS FOR THE MEASUREMENT OF SLAMMING LOADS ........................................ P. Graham, D. Sgarioto 624

SESSION 19

RESEARCH THRUSTS AND RECENT ADVANCEMENTS IN THE MODELLING OF HELICOPTERS DURING LAUNCH AND RECOVERY OPERATIONS TO SHIPS ................................................................. H. Ain, B. Macpherson, R. Toffoletto, R. Lehmann 639

FLOATING PONTOON MOTIONS, OPERATIONAL SAFE MOTION LIMITS ..................................................... E. Freeman, R. Cox, K. Splinter, F. Flocard 649

ENABLING INSTANT SITUATIONAL AWARENESS IN NAVAL BRIDGE OPERATIONS ........................................ R. Ventresca 660

SESSION 20

DEVELOPMENT OF A HARDWARE-IN-THE-LOOP TEST RIG FOR TESTING TURBOGENERATOR WASTE HEAT RECOVERY SYSTEMS ............................................... N. Olshina, C. Manzie, M. Brear, P. Hield, O. Tregenza 665

HARDWARE-IN-THE-LOOP FOR NAVAL PLATFORM POWER AND ENERGY TEST AND EVALUATION ........................................................................... W. Kong, N. Marks 677

Author Index