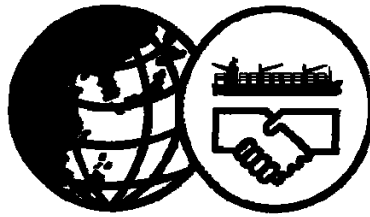


# TEAM 2008 ISTANBUL

## The 22<sup>nd</sup> Asian-Pacific Technical Exchange and Advisory Meeting on Marine Structures

Istanbul Technical University  
Suleyman Demirel Cultural Center  
Main Campus, Maslak, Istanbul-Turkey  
6-9 October 2008



Edited by  
A. Ergin

### SPONSORS:



## ***Welcome Message***

Dear Colleagues,

On behalf of the International Organizing Committee, I am delighted to welcome you to the 22nd Asian-Pacific Technical Exchange and Advisory Meeting on Marine Structures, TEAM 2008 Conference, which is to be held from October 6 through October 9 2008 in Istanbul, Turkey.

The main aim of the conference is to provide opportunities for researchers and engineers of ship and marine structures in Asian-Pacific region to exchange their ideas and share the results of their most recent research, and to promote discussions relevant to everyday problems in the fields of ship and marine structural design and production techniques.

Turkish shipbuilding industry has made a big progress in the last five years, as a result of developments in world shipbuilding sector, and made all the effort necessary in order to become one of the major shipbuilders in the world. Therefore, I believe that TEAM 2008 conference would provide a valuable and unique forum for Turkish shipbuilders to exchange their experience and discuss their everyday problems with the scientists and engineers participating from Asian-Pacific region such as Korea, Japan, Taiwan, China, Russia, USA and so on.

Besides keynote lecture on *the state of shipbuilding industry and some thoughts on near term future* by Professor A.Y. Odabaşı, we have received many interesting papers contributed by eminent scientists as well as young motivated researchers.

Therefore, I would like to welcome you to enjoy the history and charm of Istanbul and all the benefits that the “22nd Asian-Pacific Technical Exchange and Advisory Meeting on Marine Structures” will provide.

Ahmet Ergin  
Chairman – TEAM 2008  
Istanbul TURKEY

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## **Organization**

### **International Organizing Committee**

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Mr. E. Güç, Türk Loydu, Turkey  
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Mr. O.A. Demirsoylu, Admarin Designers & Shipbuilding, Turkey  
Mr. B. Sener, Delta Marine, Turkey  
Dr. E. Bayraktarkatal, Istanbul Technical University, Turkey  
Dr. A. Tuzcuoglu, Celik Tekne Shipyard, Turkey  
Dr. B. Ugurlu, Istanbul Technical University, Turkey  
Mr. S.A. Koroglu, Istanbul Technical University, Turkey

## **Previous TEAM Conferences and Honorable Members**

**Pre-TEAM** Prof. M.Mano, Kinki Univ., Japan  
Mr. J.S.Moon, Hyundai H.I., Korea

**TEAM I** (24-25, July, 1987) Mr. S.I.Hong,  
Samsung, Chungmu, Korea

**TEAM II** (18-19, November, 1988) Dr. K.Hattori,  
Sanoyasu, Kurashiki, Japan

**TEAM III** (11-12, August, 1989) Mr. S.K.Park,  
Hyundai, Ulsan, Korea

**TEAM IV** (6-8, September, 1990) Mr. H.Nishimura,  
Tsuneishi, Onomichi, Japan

**TEAM V** (30-31, August, 1991) Mr. D.K.Park,  
Daewoo, Jangseungpo, Korea

**TEAM VI** (24-25, July, 1992) Prof. Y.Tomita,  
Kinki Univ., Kure, Japan

**TEAM VII** (15-17, July, 1993) Prof. J.J.Kim,  
Univ. Of Ulsan, Ulsan, Korea

**TEAM VIII** (19-22, December, 1994) Prof. C.S.Li,  
National Taiwan Univ., Taipei, ROC

**TEAM IX** (24-27, July, 1995) Prof. T.Yao,  
Hiroshima Pref. Inform. Museum, Japan

**TEAM X** (1-4, July, 1996) Prof. S.S.Kim,  
Pusan National Univ., Pusan, Korea

**TEAM XI** (16-18, December, 1997) Prof. C.Y.Liu,  
Nanyang Technological Univ., Singapore

**TEAM XII** (6-9, July, 1998) Prof. Y.Hattori,  
Kanazawa Institute of Technology, Japan

**TEAM XIII** (18-21, October, 1999) Prof. W.H.Wang,  
National Taiwan Ocean Univ., Keelung, ROC

**TEAM XIV** (18-21, September, 2000) Prof. G.P.Turmov,  
Far East. State Tech. Univ., Vladivostok, Russia

**TEAM XV** (15-18, October, 2001) Prof. K.N.Cho,  
Hong-Ik Univ., Jochiwon, Korea

**TEAM XVI** (21-23, May, 2002) Prof. Y. Tomita,  
International Convention Center, Kobe, Japan

**TEAM XVII** (15-18, December, 2003) Prof. C.F.Hung,  
National Cheng Kung Univ., Tainan, ROC

**TEAM XVIII** (11-14, October, 2004) Prof. G.P.Turmov,  
Far East. State Tech. Univ., Vladivostok, Russia

**TEAM XIX** (4-7, December, 2005) Prof. Y.S.Choo,  
National Univ. of Singapore, Singapore

**TEAM XX** (15-18, October, 2006) Prof. C.D.Jang,  
Seoul National Univ., Seoul, Korea

**TEAM XXI** (10-13, September, 2007) Prof. M. Arai,  
Yokohama National Univ., Yokohama, Japan

### **TEAM 2008 Secretariat**

**Faculty of Naval Architecture and Ocean Engineering**  
**Istanbul Technical University**  
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**E-mail:** [team2008@itu.edu.tr](mailto:team2008@itu.edu.tr)

## General Information

### Conference Timetable (tentative)

Time	Monday	Tuesday	Wednesday	Thursday
	October 6	October 7	October 8	October 9
09:00-10:40 am		Registration/ Welcome Address/ Keynote Lecture/ Invited Lecture	C-1/C-2	G-1/G-2
10:40-11:00 am		Coffee/Tea Break		
11:00am-12:20 pm		D-1/D-2	H-1/H-2	
12:30-01:30 pm		Lunch		
01:30-02:50 pm		A-1/A-2	E-1/E-2	Technical & Cultural Tour (01:30-07:00pm)
02:50-03:20 pm		Coffee/Tea Break		
03:20-04:40 pm		B-1/B-2	F-1/F-2	
05:00 pm		Shuttle buses leave for hotels	Shuttle buses leave for hotels	
Evening	Welcome Reception (5:30 pm)		Conference Dinner (8:00 pm)	

## **REGISTRATION AND WELCOME RECEPTION**

**6 October 2008**

16:30 Registration

17:30 Reception

Welcome Reception at Taşkışla Building - Istanbul Technical University Faculty of Architecture, Taksim. The venue is in walking distance from the Conference Hotels. At Taksim Square follow the directions given in the map to find Taşkışla Building.



### **BRIEF HISTORY OF TASKISLA**

This immense building has been constructed all in structural masonry between 1848 and 1853 as a military medicine academy for the Ottoman Army under the rule of Sultan Abdülmecid. However during construction, the plans drawn by W. James Smith were modified and the building's function was changed to the military barracks in 1849. This modification was part of a construction plan that included several arsenals and military barracks that were to ensure the safety of the imperial domain around the Dolmabahçe Palace. The building sustained some damage in the earthquake of 10 July 1894, and was restored by architect Raimondo D'Aronco. In 1909, the rebellious troops were based in the building, thus it has become the scene of long fighting. Some results are visible in the façade, as few of the gun shells are still embedded in the stone columns of the entrance. In 1944 the building was handed over to the I.T.U. and restored by architects Paul Bonatz and Emin Onat. Teaching started in the building in 1950, with the civil engineering and architecture faculties. In 1983 it has been classified as a first degree historical monument. In 1996 the World Habitat Congress was organized partly in the Faculty. Ever since, it is a natural part of the congress valley of Istanbul. The plan scheme of Taskisla is classical: four equal sides marked with four corner edifices and a vast courtyard. The west façade is crowned with a monumental entrance. (Prof.Dr. Afife Batur)







## CONFERENCE VENUE

The conference will take place at Maslak Campus, Istanbul Technical University - half an hour distance from Taksim Square, the city centre.

Conference Venue - Suleyman Demirel Cultural Center (SDKM)  
Istanbul Technical University, Main Campus

The full address is shown below:

Istanbul Teknik Universitesi  
Ayazaga Kampusu  
Suleyman Demirel Kultur Merkezi  
Maslak 34469  
Istanbul, Turkey

### Istanbul Technical University – Main Campus (Maslak Campus)



The Conference Local Organization Committee has arranged **shuttle bus transfer services - from the Conference Hotels to the Venue** (ITU Maslak Campus - Suleyman Demirel Convention Center). Shuttle dates will be **all conference session days as October 7, October 8, and October 9**

Shuttle buses will be departing from Taksim to the Venue in the morning and from the Venue to Taksim in the evening.

*\*\* Shuttle times will be announced later \*\**

**The Suleyman Demirel Social and Cultural Center (Conference Venue)** was newly opened in April 2000. This center occupies 9200 m2 on the Ayazaga Campus and features a conference hall, a lobby, shops, clubs, offices, and canteen.



### **Conference Dinner (Banquet)**

8 October (Wednesday) 2008

8:00 pm

Feriye Restaurant (<http://www.feriye.com>)

A bus service will be provided from the conference hotels – Feriye Restaurant – hotels.

### **Cultural Tour**

9 October (Thursday) 2008

01:30 pm – 07:00 pm

## Accompanying Person's Program

	<b>Morning</b>	<b>Afternoon</b>	<b>Evening</b>
<b>6 October (Monday)</b>	Golf Tournament		Welcome Reception (05:30 pm)
<b>7 October (Tuesday)</b>			
<b>8 October (Wednesday)</b>	Ladies Program		Conference Dinner (08:00 pm)
<b>9 October (Thursday)</b>		Cultural Tour (01:30- 07:00 pm)	

## **HOW TO GET FROM AIRPORT TO HOTEL (TRANSPORTATION INFORMATION)**

It is important to know that there are two international airports in Istanbul: Istanbul Atatürk International Airport on the European side and Sabiha Gokcen International Airport on the Asian side of Istanbul.

Both are modern, new civil airports, serving domestic and international scheduled and charter flights 24 hours a day. For further details, please check the web sites of the airports and ask your travel agent or airline the name of your arrival airport in Istanbul. This information is crucial to get to your hotel as comfortable and quick as possible. All TEAM 2008 hotels are very centrally located around Taksim square, located in the European side of Istanbul. Therefore, to get from either airport to your hotel, you should keep in mind to use the Airport – Taksim track. There are 3 different ways to do it by using public transportation:

### **A. HAVAS SHUTTLE BUS SERVICE**

Havas shuttle bus services are available every half hour between 06:00 a.m. and 01:00 a.m. from Atatürk airport to Taksim Square and vice versa. Ticket price: 6 Euro. Havas shuttle buses are also operating from/to Sabiha Gokcen Airport. For more information and detailed schedule of shuttle services please check HAVAS website.

### **B. AIRPORT TAXI**

In Istanbul taxis are considerable cheap compared to other cities in most parts of the world. Atatürk Airport Taxi is a big company with a fleet of more than 400 cars, safe and reliable, serving 24 hours a day at International and Domestic Terminals. It costs about 30 Euro from airport to the hotels around Taksim Square. There is a surcharge of 50% between 00:00 a.m. and 06:00 a.m.

Taxis are also available outside the Sabiha Gokcen Airport, but due to distance from there to Taksim via the Intercontinental Bridge, the price might be higher. All taxis have taximeter. Payment should be made in Euro, US Dollar or Turkish Lira cash. You can use ATM's or bank offices at the airport to get change. It is not customary to tip drivers.

### **C. LIGHT RAIL TRANSPORTATION SYSTEM (METRO)**

Schedules of metro, which has been providing access between the stations of Aksaray and Atatürk Airport as follows:

Week days: from 06:00 a.m. till 00:00 a.m.

Saturdays: from 06:15 a.m. till 00:00 a.m.

Sundays: from 06:30 a.m. till 00:00 a.m.

Then, we recommend you to get a taxi from Aksaray metro station to your hotel

### **D. SPECIAL TRANSFER SERVICE FOR TEAM 2008 PARTICIPANTS**

This is an optional service for the convenience of TEAM 2008 participants, specially arranged by the Gemini tourism. You will be met by a staff from GEMINI tourism with an TEAM 2008 signboard in the International Arrival Hall (after passport control & customs area) of Atatürk Airport. If you wish to use this service, please visit the Gemini Tourism's web side [www.geminitourism.com](http://www.geminitourism.com), fill in the Transfer Form and send it to Ms. Zeynep Urashı ([zeynep.uras@geminitourism.com](mailto:zeynep.uras@geminitourism.com)).

## TECHNICAL SESSIONS

**7 October 2008 (Tuesday)**

**Page**

**9:00 am** Registration

**Opening Ceremony**

**10:00am** **Opening Concert**

**10:30am** **Welcome Address**

Prof. A. Ergin, Chairman of International Organizing Committee

Prof. A.Y. Odabaşı, Chairman of Local Organizing Committee

Dean, ITU Faculty of Naval Architecture and Ocean Engineering

Rector, ITU

**11:00am** **Keynote Lecture**

**1**

The state of shipbuilding industry and some thoughts on near term future

Prof. A.Y. Odabaşı

**11:30am** **Invited Lecture**

**12**

Hydroelasticity of Ships: Taking stock and moving forward

Prof. P. Temarel

**12:30pm** **Lunch**

**Session A-1 Noise and Vibration (Tuesday, 7 October 2008)**

**01:30pm** Vibration analysis of a 10 000-TEU container ship using three-dimensional whole ship FEA model

**22**

J. Noguchi

**01:50pm** Hydroelastic vibrations of a container ship and a VLCC in waves

**29**

Kazuhiro Iijima and Tetsuya Yao

**02:10pm** Response comparisons of a large floating structure by grillage and shell FE model

**38**

Junghyun Kim, Kazuhiro Iijima and Masahiko Fujikubo

**02:30pm** The vibration response analysis for the post panamax container ship using whole ship model **47**

Takashi Kawai, Hiroki Kusumoto, Hiroyuki Takahashi, Takanori Deguchi

**Session A-2 Fatigue and Fracture (Tuesday, 7 October 2008)**

**01:30pm** A study on the prediction technique of remaining fatigue life using fatigue indicator **53**

Seung Hwan Boo, Kyung Su Kim, Sung Chan Kim, Jang Hyun Lee, Young Gun Cho and Seul Ki Kim

**01:50pm** A study on prediction of crack propagation life on welded joints of ship structures **62**

Chang-Youl Park, Kyung-Su Kim, Ki-Sung Kim and Hyun-Tae Jeon

**02:10pm** A study of fatigue strength assessment for 180K bulk carrier **71**

Chun-Sik Shim, Jeong-Hyun Hwang, Kang-Kil Kim and Hoon-Dong Lee

**02:30pm** Fatigue life comparison in tanker structures-CSR vs. Pre-CSR **78**

Seong Ki Kim and Young Bae Kim

**02:50pm** **Coffee Break**

**Session B-1 Fatigue and Fracture (Tuesday, 7 October 2008)**

**03:20pm** A study on spectral fatigue assessment of FPSO operating in wave and swell sea-state; west offshore of Africa **82**

Oe-Ju Hwang, Seock-Hee Jun and Joong-Kyoo Kang

**03:40pm** Crack identification of stiffened plates by two-dimensional discrete wavelet transforms **89**

J. M. Yang, C. N. Hwang and Yaubin Yang

**04:00pm** Constitutive equation for cyclic plasticity phenomena under macroscopically elastic fatigue condition **97**

Seiichiro Tsutsumi, Fionn Dunne, Koji Gotoh and Masahiro Toyosada

**04:20pm** Probabilistic approach of strain energy density of materials **104**

Kuen-Nan Lin and Tar-Zen Su

## **Session B-2 Welding and Line Heating (Tuesday, 7 October 2008)**

<b>03:20pm</b>	Analysis and prediction of overlapping effect on plate forming by line heating	<b>109</b>
	Adan Vega, Sherif Rashed, Yoshihiko Tango, Morinobu Ishiyama and Hidekazu Murakawa	
<b>03:40pm</b>	Measurement and analysis on weld initial deflection of stiffened plates	<b>117</b>
	Tak Kee Lee, Chae Whan Rim, Dae-Suk Han, Jae-Myung Lee and Byung Hyun Kim	
<b>04:00pm</b>	Development of a temperature estimation technique for induction line heating process	<b>122</b>
	Naoki Osawa, Junji Sawamura, Morinobu Ishiyama, Yoshihiko Tango and Ryohei Sugimoto	
<b>04:20pm</b>	Application of springback compensation algorithm for hull forming automation using multi-point forming in shipbuilding	<b>131</b>
	Jang Hyun Lee, Jong Seong Yoon, Se Yun Hwang and Hwang Beom Lee	

## **8 October 2008 (Wednesday)**

### **Session C-1 Noise and Vibration (Wednesday, 8 October 2008)**

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	Makoto Toyoda and Tomoki Sakurai	
<b>09:20am</b>	Vibration study of heavy machinery in vessel with anti-resonance design concept	<b>146</b>
	Hyundong Cho, Youngmo Kong and Jooho Heo	
<b>09:40am</b>	Radiated noise analysis for LNG carrier using power flow analysis method	<b>150</b>
	Sung-Hee Kim, Suk-Yoon Hong, Hyun-Wung Kwon and Jee-Hun Song	
<b>10:00am</b>	Application of the Fourier-Kochin theory to the hydroelastic analysis of stationary floating structures	<b>158</b>
	Bahadır Uğurlu and Carlos Guedes Soares	



- 10:20am** Application of structural intensity analysis to reduce local structural vibration of a ro-ro passenger ferry
- Dae-Seung Cho, Tae-Muk Choi, Jin-Hyeong Kim, Kyung-Soo Kim and Hyuk Kwon

**Session C-2 Failure and Damage Analysis (Wednesday, 8 October 2008)**

- 09:00am** Analytical method for simulation of buckling and post-buckling behaviour of cylindrically curved plates under axial compression **167**
- Joo Shin Park, Kazuhiro Iijima, Tetsuya Yao and Masahiko Fujikubo
- 09:20am** Comparison of structural strength according to the number of bottom girder for 180K bulk carrier based on CSR **175**
- Chun-Sik Shim, Kang-Kil Kim, Jeong-Hyun Hwang and Hun-Dong Lee
- 09:40am** Target reliability for hull girder ultimate strength of bulk carriers and tankers by a risk model **183**
- Yuji Sasaki, Kazuhiro Iijima and Masahiko Fujikubo
- 10:00am** An experimental study of torsional ultimate strength of a container ship **191**
- Y. Tanaka, T. Ando, Y. Anai, Y. Hashizume, M. Sakuma, T. Yao, M. Fujikubo and K. Iijima
- 10:20am** Study on the local stress evaluation technique for web stiffened cruciform joint subject to pressure loading **199**
- Naoki Osawa, Junji Sawamura, Shota Suzuki, Tsutomu Fujiwara and Masaki Kuwahara
- 10:40am** **Coffee Break**

**Session D-1 Operation and Maintenance (Wednesday, 8 October 2008)**

- 11:00am** Development of logistics simulation system by Petri net **208**
- Kunihiro Hamada, Mitsuru Kitamura, Masayuki Okimoto, Hiroshi Sorakubo and Krisana Punayangkool
- 11:20am** Assessment of safety on the GPE blocks during on-shore transportation **216**
- Sung Chan Kim, Ki Sup Hong, Dae Kyun Shin, Byeong-Seok Yu, Gwan Heung Kim, Yong Seok Seo and Se Zin Paek

**11:40am** Current power marine structure interaction modeling **223**  
Chul-Hee Jo, Kang-Hee Lee and Ki-Ho Kim

**12:00am** Definition of the optimum characteristics of the vessels with horizontal type of cargo operations by economic criteria **230**  
Michael V. Voyloshnikov and Marina V. Kovalenko

**Session D-2 Loads and Hull Structural Responses (Wednesday, 8 October 2008)**

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Shinichiro Kurata, Kazuhiro Iijima and Masahiko Fujikubo

**11:20am** 3-D F.E. analysis for cargo holds of CSR capesize bulker **247**  
ByungChang Ahn, ManSoo Kim

**11:40am** Bow structure FEM analysis by considering bow flare impact and plunge for Containership **253**  
Shou-Hsiung Hsu, Ya-Jung Lee, Yi-Chih Kao and Chia-Neng Chen

**12:00am** Motion characteristics of the downstream cylinder in tandem arrangements of two self-excited flexible in hanging-off circular cylinders in subcritical Reynolds numbers **259**  
Rudi Walujo Prastianto, Koji Otsuka and Yoshiho Ikeda

**12:30pm** **Lunch**

**Session E-1 Operations and Maintenance (Wednesday, 8 October 2008)**

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Tomohiro Yuzui and Makoto Arai

**01:50pm** A study of the performance and economy of ballast-free ships with V-form sections **275**  
Yuji Arai and Makoto Arai

**02:10pm** Ubiquitous marine structure inspection system based on mixed reality **283**  
Kyung-Ho Lee, Jung-Min Lee, Dong-Guen Kim and Young-Soo Han

<b>02:30pm</b>	Design of a liner shipping network considering allocation of empty containers	<b>291</b>
	Kelly Takano and Makoto Arai	

**Session E-2 Loads and Hull Structural Responses (Wednesday, 8 October 2008)**

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	Il-Hyoung Lee, Dong Kun Park and Young Nam Kim	
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	Hong Ryeul Ryu, Wha Soo Kim, Hyun Ho Lee and Seung Ho Yang	
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	Sang-Gab Lee, Jeong-Oh Hwang and Wha-Soo Kim	
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	Toichi Fukasawa	
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**Session F-1 Loads and Hull Structural Responses (Wednesday, 8 October 2008)**

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## **Session F-2 Composites (Wednesday, 8 October 2008)**

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	John W. Bridge, A. E. Grabher and Don Radford	
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	Yukichi Takaoka, Yohichi Kuwano, Masahiro Maeda and Takao Yoshikawa	
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	Shinya Ohiwane, Shigehiro Mori and Takao Yoshikawa	
<b>09:20am</b>	The development of production oriented design and knowledge base interface of ship structure design	<b>393</b>
	Chen-Hsing Cheng and Chung-Ping Chen	
<b>09:40am</b>	A study on a robust optimization of principal particulars	<b>401</b>
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**10:20am** Application of ICP algorithm for optimized registration of object surface and unfolding surface in ship-hull plate forming **414**

Jang Hyun Lee, Jong Sung Yoon, Cheolho Ryu and Hwang Beom Lee

**Session G-2 Welding and Line Heating (Thursday, 9 October 2008)**

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Hiroataka Kihara, Yukiko Konno, Shigenobu Okazawa and Masahiko Fujikubo

**09:20am** Design of induction heating coil for automatic hull forming system **429**

Chang Doo Jang, Hyun Soo Ryu, Ho Kyung Kim and Do Won Seo

**09:40am** Effect of deck welding sequence on panel buckling and welding deformation during block assembly of car carriers **437**

Yusuke Tajima, Sherif Rashed, Yasuhisa Okumoto, Shigeki Sasaki, Hisashi Serizawa and Hidekazu Murakawa

**10:00am** Prediction of welding distortion by 3D elastic FEM using inherent strain estimated through inverse analysis **446**

Isaku Chimura, Hisashi Serizawa and Hidekazu Murakawa

**10:20am** A systematic design of H/LTR methodology on autonomous diving and steering of unmanned underwater vehicles

Cheng-Neng Hwang, J.M. Yang, K.-L. Chen and Shun-Min Wang

**10:40 am** **Coffee Break**

**Session H-1 Operation and Maintenance (Thursday, 9 October 2008)**

**11:00am** A study on a method for a maintenance of floating platform considering remaining life benefit **454**

Ryouji Iwata, Yasumi Kawamura, Tomonori Asa and Motohiko Murai

**11:20am** Towards safer ships: how the use of active guidance systems on board may increase navigation safety **462**

Luca Sebastiani, Giovanni Cusano, Alessandro Pescetto and Giorgio Bacicchi

**11:40am** Preliminary study for controlling hydrodynamic performance of hydrofoils owing to the uneven surface structure with hemispherical asperity **473**  
Kei Shingu and Taishi Wada

**12:00am** Smart material and distributed parameter control applications in hydrofoil design **479**  
Demir Sindel

**Session H-2 Failure and Damage Analysis (Thursday, 9 October 2008)**

**11:00am** A study on racking analysis for PCTC applied longitudinal stiffening system **482**  
Tae-Yong Kim, Young-Dal Choi, Sung-Kwang Shin, Kyu-Ho Lee ,  
Hyung-Ju, Nam and Sung-Eun Kim

**11:20am** Nonlinear FEM analysis of pitted mild steel plate subjected to in-plane compression **489**  
Xiaoli Jiang and Carlos Guedes Soares

**11:40am** Design equation for the ultimate capacity of intact and grounded double hull tankers designed according to the common structural rules **497**  
Arwa W. Hussein and Carlos Guedes Soares

**12:00am** Comparison study of the crashworthiness for different types of sandwich Structures **506**  
C.F. Hung, K.R. Chen and B.J. Lin