

*Proceedings of the ASME*

**39TH INTERNATIONAL CONFERENCE ON OCEAN,  
OFFSHORE AND ARCTIC ENGINEERING  
- 2020 -**

---

**VOLUME 5**

**OCEAN SPACE UTILIZATION**

presented at

ASME 2020 39TH INTERNATIONAL CONFERENCE ON OCEAN,  
OFFSHORE, AND ARCTIC ENGINEERING

AUGUST 3-7, 2020

ONLINE

sponsored by

OCEAN, OFFSHORE AND ARCTIC ENGINEERING DIVISION, ASME

**THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS  
Two Park Avenue \* New York, NY. 10016**

Printed from e-media with permission by:

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Statement from By-Laws: The Society shall not be responsible for statements or opinions  
Advanced in papers. . .or printed in its publications (7.1.3)

INFORMATION CONTAINED IN THIS WORK HAS BEEN OBTAINED BY ASME FROM SOURCES BELIEVED TO BE RELIABLE. HOWEVER, NEITHER ASME NOR ITS AUTHORS OR EDITORS GUARANTEE THE ACCURACY OR COMPLETENESS OF ANY INFORMATION PUBLISHED IN THIS WORK. NEITHER ASME NOR ITS AUTHORS AND EDITORS SHALL BE RESPONSIBLE FOR ANY ERRORS, OMISSIONS, OR DAMAGES ARISING OUT OF THE USE OF THIS INFORMATION. THE WORK IS PUBLISHED WITH THE UNDERSTANDING THAT ASME AND ITS AUTHORS AND EDITORS ARE SUPPLYING INFORMATION BUT ARE NOT ATTEMPTING TO RENDER ENGINEERING OR OTHER PROFESSIONAL SERVICES. IF SUCH ENGINEERING OR PROFESSIONAL SERVICES ARE REQUIRED, THE ASSISTANCE OF AN APPROPRIATE PROFESSIONAL SHOULD BE SOUGHT.

For authorization to photocopy material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act, contact the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923, Tel: 978-750-8400

Requests for special permission or bulk reproduction should be addressed to [permissions@asme.org](mailto:permissions@asme.org).

**ISBN NO. 978-0-7918-8436-2**

**© 2020 ASME**

**All rights reserved.**

**Printed in U.S.A with permission by Curran Associates, Inc. (2021)**

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# CONTENTS

## OCEAN SPACE UTILIZATION

### AQUACULTURE AND RELATED TECHNOLOGY

**OMAE2020-18112..... V005T05A001**

Numerical Analysis of a Floating Fish Cage With Feeding Systems

*Lin Li, Mathias Bruset, Muk Chen Ong, Xiaopeng Wu*

**OMAE2020-18355..... V005T05A002**

Numerical Simulation of Hydrodynamics Around Net Meshes Using REEF3D

*Gang Wang, Tobias Martin, Liuyi Huang, Hans Bihs*

**OMAE2020-18513..... V005T05A003**

Experimental Study on Fish-Harvest Performance of the Flexible Hose Net

*Qiao Li, Yue Li, Yoichi Mizukami, Shuchuang Dong, Takero Yoshida, Daisuke Kitazawa*

**OMAE2020-18605..... V005T05A004**

Numerical Modelling of the Interaction of Moving Fish Nets and Fluid

*Tobias Martin, Gang Wang, Hans Bihs*

**OMAE2020-18720..... V005T05A005**

Accuracy of Simplified Methods for Fatigue Damage Estimation of Exposed Fish Farms

*Martin Slagstad, Pal Takle Bore, Jorgen Amdahl*

**OMAE2020-18875..... V005T05A006**

Hydrodynamic Loads on Net Panels With Different Solidities

*Heidi Moe Fore, Per Christian Endresen, Carina Norvik, Pal Lader*

### DEEPSEA MINING AND OCEAN RESOURCES

**OMAE2020-18194..... V005T05A007**

Experimental Investigation of Large Particle Slurry Transport in Vertical Pipes With Pulsating Flow

*Sotaro Masanobu, Satoru Takano, Shigeo Kanada, Masao Ono, Hiroki Sasagawa*

**OMAE2020-18257..... V005T05A008**

Experimental Study on Three Phase Flow in Inclined Pipe for Deep Sea Mining

*Satoru Takano, Sotaro Masanobu, Joji Yamamoto, Shigeo Kanada, Masao Ono, Hiroki Sasagawa*

**OMAE2020-18346..... V005T05A009**

Configuration and Performance Analysis of Deep Ocean Mining Flexible Riser

*Yuxin Gai, Shuangxi Guo, Yilun Li, Min Li, Weimin Chen*

**OMAE2020-18688..... V005T05A010**  
The Effects of Solid-Liquid Internal Flow on the Dynamic Behavior of a Reduced-Scale Jumper for Deep-Sea Mining  
*Marcio Yamamoto, Tomo Fujiwara, Shigeo Kanada, Masao Ono, Satoru Takano, Joji Yamamoto, Sotaro Masanobu*

## **FLOATING SYSTEMS FOR RENEWABLE ENERGY**

**OMAE2020-18189..... V005T05A011**  
How the Hydrodynamic Response of PA-WECs' Array Under Maximizing the Power Generation by its Arrangement and Control Force Change?  
*Motohiko Murai, Junki Funada, Qiao Li*

**OMAE2020-18409..... V005T05A012**  
Quantitative Wear Estimation for Floating Structures by Using 3-D Geometry of Mooring Chain  
*Takaaki Takeuchi, Tomoaki Utsunomiya, Koji Gotoh, Iku Sato*

**OMAE2020-18595..... V005T05A013**  
Motion Characteristics of a Spar-Buoy With Ring-Fin Motion Stabilizer in Deep Sea  
*Toru Katayama, Yusuke Yamamoto, Taishi Morimoto, Masahiro Goto*

**OMAE2020-18762..... V005T05A014**  
Effects of Scale and Configuration of Air Chamber of OWC Type WECs on Air Chamber Characteristics  
*Tomoki Ikoma, Shota Hirai, Yasuhiro Aida, Koichi Masuda, Hiroaki Eto*

## **HIGH TIDE AND TSUNAMIS**

**OMAE2020-19088..... V005T05A015**  
Study on Applicability of FEMA Formula in Prediction of Impact Load by Tsunami Drifting Vessels on Coastal Zone Structures  
*Koichi Masuda, Tomoki Ikoma, Hiroaki Eto, Yasuhiro Aida, Kazuki Murata*

## **MARINE SPATIAL PLANNING AND MARINE ENVIRONMENT**

**OMAE2020-18228..... V005T05A016**  
A Preliminary Study on the Site Selection of Offshore Wind Power Generation  
*Koki Miki, Shigeru Tabeta, Katsunori Mizuno*

**OMAE2020-19301..... V005T05A017**  
Impacts of the Madden-Julian Oscillation on South China Sea Monsoon  
*Qun Zhou, Lixin Wei*

## **NEW CONCEPTS FOR OCEAN SPACE UTILIZATION**

**OMAE2020-18070..... V005T05A018**  
Design Considerations of a Subsea Shuttle Tanker System for Liquid Carbon Dioxide Transportation  
*Yihan Xing, Muk Chen Ong, Tor Hemmingsen, Kjell Einar Ellingsen, Lorents Reinas*

**OMAE2020-18279**..... **V005T05A019**  
Planning and Design of Floating Offshore Architecture  
*Akane Takahashi, Ikuo Yoshida*

**OMAE2020-18785**..... **V005T05A020**  
Conceptual Design and Model Tests for a Mid-Water Floating Hyperloop Tunnel  
*L. J. Kemp, W. J. Otto, O. J. Waals*

**OMAE2020-19026**..... **V005T05A021**  
On GIS Based Selection of Suitable Site Including Cooperation With Surrounding  
Medical Facilities by Mesh Analysis of Floating Medical Support System on Big  
Disaster  
*Hiroaki Eto, Sena Shimomoto, Sachio Togawa, Morikazu Yamamoto, Shintaro Miyasawa,  
Junko Yamaguchi, Tomoki Ikoma, Yasuhiro Aida, Koichi Masuda, Hiroki Udagawa*

## **UNDERWATER DEVELOPMENT AND TECHNOLOGY**

**OMAE2020-19105**..... **V005T05A022**  
Basic Study on Positioning of Autonomous Underwater Vehicle Based on Acoustic  
Ranging From One Reference Device  
*Yoshitaka Watanabe*

**OMAE2020-19112**..... **V005T05A023**  
Experimental Study on the Flow Around a Rotating Cylinder  
*Chang-Kyu Rheem*

## **UTILIZATION OF SEAWATER**

**OMAE2020-19215**..... **V005T05A024**  
Utilization of Ocean Water for CO<sub>2</sub> Capture via Amine Scrubbing  
*Abhishek P. Ratanpara, Alexander Shaw, Sanat Deshpande, Myeongsub Kim*

## **VERY LARGE FLOATING STRUCTURE**

**OMAE2020-18958**..... **V005T05A025**  
A Fundamental Study on Motion Characteristics of the Large-Scale Floating Coal  
Transshipment Station by Elastic Mooring Lines  
*Hiroaki Eto, Ryo Sekiguchi, Hitomi Kashima, Tomoki Ikoma, Yasuhiro Aida, Koichi Masuda*

**OMAE2020-18962**..... **V005T05A026**  
A Fundamental Study on Plastic Strain Accompanying Deformation in Large-Scale  
Floating Coal Transshipment Station  
*Ryo Nishigochi, Hiroaki Eto, Koji Iizuka, Tomoki Ikoma, Yasuhiro Aida, Koichi Masuda*

**OMAE2020-19002**..... **V005T05A027**  
Characteristics of OWC Type WEC Dampers Installed on a Very Large Floating  
Structure  
*Tomoki Ikoma, Shoichiro Furuya, Yasuhiro Aida, Koichi Masuda, Hiroaki Eto*