

## Wei-Liang Chuang, Ph.D.

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CONTACT INFORMATION	Department of Marine Environment and Engineering National Sun Yat-sen University Kaohsiung City, Taiwan 07-5252000 ext 5184 wlchuang@mail.nsysu.edu.tw
RESEARCH INTERESTS	<p><b>Coastal &amp; Ocean Engineering:</b> Wave-structure interaction; breaking wave impact; wave slamming; wave overtopping and runup; wave energy converter; water wave mechanics; wave breaking processes; sediment transport processes; scour; UAS-based coastal survey</p> <p><b>Experimental techniques:</b> Imaging-based flow quantification techniques: particle image velocimetry (PIV) &amp; bubble image velocimetry (BIV); optical fiber-based measurement technique for multiphase flows, fiber optic reflectometry (FOR).</p> <p><b>Computational Fluid Dynamics:</b> Navier-Stokes solver with large eddy simulation turbulence model; Reynolds averaged Navier-Stokes equations with <math>k</math>-<math>\epsilon</math> turbulence closure model.</p> <p><b>Hydraulic engineering:</b> Open channel hydraulics; pump sump/intake flows.</p> <p><b>Meteorology:</b> Imagery-based derivation of atmospheric motion vector (AMV).</p>
EDUCATION	<p><b>Texas A&amp;M University (TAMU)</b>, College Station, Texas, USA</p> <p><b>Ph.D.</b>, Civil and Environmental Engineering 08/2012–12/2017</p> <ul style="list-style-type: none"><li>• Dissertation title: <i>Extreme wave impacts on offshore and coastal structures</i></li><li>• Academic Advisor: Kuang-An Chang, Ph.D.</li></ul> <p><b>National Cheng Kung University (NCKU)</b>, Tainan, Taiwan</p> <p><b>M.S.</b>, Coastal &amp; Ocean Engineering 09/2008–07/2010</p> <ul style="list-style-type: none"><li>• Thesis title: <i>Numerical study on pump sump flows</i></li><li>• Academic Advisor: Shih-Chun Hsiao, Ph.D.</li></ul> <p><b>B.S.</b>, Hydraulic &amp; Ocean Engineering 09/2004–06/2008</p>
PROFESSIONAL EXPERIENCE	<p><b>Assistant Professor</b> <b>Marine Environment and Engineering</b>, NSYSU 08/2019–Present</p> <p><b>Postdoctoral Researcher</b> <b>Civil and Environmental Engineering</b>, TAMU 02/2018–07/2019</p> <p><b>Research Assistant</b> <b>Civil and Environmental Engineering</b>, TAMU 08/2012–12/2017</p>

ACADEMIC  
RESEARCH  
PROJECTS

**Research Assistant**  
**Tainan Hydraulics Laboratory, NCKU** 08/2011–07/2012

**Corporal of Engineering Troops**  
Combined Logistics Command, Ministry of  
National Defense, Taiwan 08/2010–07/2011

**Nearshore bathymetry Measurement with Unmanned Aerial Vehicle.**

Civil and Environmental Engineering, TAMU 04/2018–Present

- To prove the concept of measuring the nearshore bathymetry with unmanned aerial vehicle (UAV).

**Iron Electrocoagulation for Water Purification: Virus Removal and in situ Particle Size Distribution.**

Civil and Environmental Engineering, TAMU 02/2018–Present

- To validate the mixing power input with measured TKE.
- To obtain time-varying floc size distribution with imagery methods.
- To evaluate the efficiency of iron electrocoagulation for water purification.

**Advancement of Modern Measurement Techniques in OTRC Wave Basin with Application of Air Gap Flow.**

Offshore Technology Research Center, TAMU 09/2017–Present

- To incorporate optical velocimetry into a routine TLP model test in ocean engineering.
- Main goals include obtaining a benchmark data set, advancing existing measurement techniques, and investigating effect of air gap and local wave amplification induced by wave-column interaction.

**Validity of Deriving Atmospheric Motion Vectors from Satellite Images with Particle Image Velocimetry.**

Civil and Environmental Engineering, TAMU 01/2017–03/2018

- Successfully applied PIV to derive AMVs for infrared channel.
- Validation with NWP and sounding data was performed.

**Implementation of Bubble Image Velocimetry in OTRC Wave Basin.**

Civil and Environmental Engineering, TAMU 09/2012–08/2017

- Designed and conducted several experiments in the Ocean Engineering Lab (wave flume) and the **Offshore Technology Research Center** (deep-water wave basin) at TAMU.

- Extended the BIV technique to measure the fluid velocity maps around moving offshore structures.
- Measured and investigated the green water kinematics on a tension-leg platform under plunging breaking waves, the kinematics of random green water events on a fixed platform, and the high pressure caused by green water and breaking waves. Gained understanding of the role of compressed air bubbles in plunging breaking wave impacts.

### **Building Capacities to Withstand Extreme Coastal Wave Forces.**

Civil and Environmental Engineering, TAMU 07/2016–05/2017

- Designed and conducted experiments in a large wave basin in the **O.H. Hinsdale Wave Research Laboratory** at Oregon State University.
- Investigated the forces, pressures, and fluid kinematics on a coastal building with different orientations under tsunami bore impacts.
- Successful attempt to quantify the wave runup velocity maps using optical velocimetry.

### **Oil Droplet Sizing and Velocity Determination Using Fiber Optic Reflectometer.**

Civil and Environmental Engineering, TAMU 07/2016–Present

- To develop a technique capable of simultaneously measuring the fractional volume of water, oil droplets, and air bubbles in a bubble plume.
- To establish methods in extracting the size distributions and rising velocities of oil droplets and air bubbles from FOR signals.

### **Breaking Wave Interactions with a Deck Structure.**

Civil and Environmental Engineering, TAMU 02/2014–12/2014

- Designed and conducted experiments in the Ocean Engineering Lab at TAMU.
- Measured and investigated the fluid velocity, void fraction, and impact pressure above (overtopped wave) and underneath (wave slamming) a deck structure.
- Examined the relationship between the impingement points of incoming waves and their corresponding violence of impact.

### **Experimental Study of Wave Breaking in Deep Water: Large-Scale Experiment.**

Tainan Hydraulics Laboratory, NCKU 01/2014–12/2015

- Designed and conducted experiments in a large wave flume (300 m long) in the **Tainan Hydraulics Laboratory** at NCKU.
- Investigated the wave breaking processes and air bubble dynamics.
- Examined scale effects by comparing to small-scale experiments.

INDUSTRY  
RESEARCH  
PROJECTS

**Floating, Production, Storage and Operation (FPSO) Project.**

Offshore Technology Research Center, TAMU

03–05/2016

- Conducted the measurements of fluid velocity and void fraction.
- Implemented optical triggering technique for detecting random events.

\*Other experimental data and information is confidential and intended only for the use of the clients.

**Semi-Submersible Project.**

Offshore Technology Research Center, TAMU

03/2017

- Conducted fluid velocity measurements.

\*Other experimental data and information is confidential and intended only for the use of the clients.

TEACHING  
EXPERIENCE

**Lecturer**

Civil and Environmental Engineering, TAMU

06/2018

- *Computer Applications in Engineering and Construction* (CVEN302)  
–Lectured the concept and MATLAB application of linear algebra and regression.

**Teaching Assistant**

Civil and Environmental Engineering, TAMU

09/2017–12/2017

- *Computer Applications in Engineering and Construction* (CVEN302)  
–Assisted the class and assist weekly lab designed to learn how to solve practical problems with MATLAB.

**Teaching Assistant**

Ocean Engineering, TAMU

01/2017–05/2017

- *Ocean Engineering Laboratory* (OCEN410) –Prepared, instructed, and performed laboratory experiments in the field of ocean engineering.

**Teaching Assistant**

Hydraulic & Ocean Engineering, NCKU

01/2009–06/2010

- *Fluid Mechanics Laboratory* –Prepared, instructed, and performed fluid mechanics laboratory experiments.

**Teaching Assistant**

Hydraulic & Ocean Engineering, NCKU

09/2009–01/2010

- *Engineering Mathematics II*

JOURNAL  
ARTICLES

- [1] Chuang, W.-L., Chou, C.-B., Chang, K.-A., Chang, Y.-C., and Chin, H.-L. (2019) "Atmospheric motion vectors derived from an infrared window channel of a geostationary satellite using particle image velocimetry." *Journal of Applied Meteorology and Climatology*, 58, 199-211.
- [2] Sun, S.-H., Chuang, W.-L., Chang, K.-A., Kim, J.Y., Kaihatu, J., Huff, T., Feagin, R. (2018) "Imaging based nearshore bathymetry measurement using an unmanned aerial vehicle." *Journal of Waterway, Port, Coastal, and Ocean Engineering*, 145(2), 04018044.
- [3] Chuang, W.-L., Chang, K.-A., and Mercier, R. (2018) "Kinematics and dynamics of green water on a fixed platform in a large wave basin under focusing waves and random waves." *Experiments in Fluids*. 59:100.
- [4] Na, B., Chang, K.-A., Huang, Z.-C., Hsu, W.-Y., Chuang, W.-L. and Chen, Y.-Y. (2018) "Large-scale laboratory observation of fluid properties in plunging breaking waves." *Coastal Engineering*, 138, 66-79.
- [5] Chuang, W.-L., Chang, K.-A., and Mercier, R. (2017) "Impact pressure and void fraction due to plunging breaking wave impact on a 2D TLP structure." *Experiments in Fluids*, 58:68.
- [6] Chuang, W.-L., Chang, K.-A., and Mercier, R. (2015) "Green water velocity due to breaking wave impingement on a tension leg platform." *Experiments in Fluids*, 56:139.
- [7] Chuang, W.-L., Hsiao, S.-C., and Hwang, K.-S. (2014) "Numerical and experimental study of pump sump flows." *Mathematical Problems in Engineering*, 735416.
- [8] Chuang, W.-L. and Hsiao, S.-C. (2011) "Three-dimensional numerical simulation of intake model with cross flow." *Journal of Hydrodynamics*, Ser. B, 23:3, 314-324.

CONFERENCE  
PROCEEDINGS

- [1] Chuang, W.-L., Chang, K.-A., and Mercier, R. (2019) "Review of experimental modeling of green water in laboratories." *29<sup>th</sup> International Ocean and Polar Engineering Conference*, Honolulu, Hawaii, USA.
- [2] Chuang, W.-L., Chang, K.-A., Kaihatu, J., Cienfuegos, R., and Mokrani, C. (2018) "Experimental modeling of tsunami bore impingement on a simplified coastal building." *37<sup>th</sup> International Conference on Coastal Engineering*, Baltimore, Maryland.
- [3] Chuang, W.-L., Chang, K.-A., and Mercier, R. (2018) "Green water flow on a fixed model structure in a large wave basin under random waves." *37<sup>th</sup> International Conference on Ocean, Offshore and Arctic Engineering*, Madrid, Spain.
- [4] Chuang, W.-L., Chang, K.-A., and Mercier, R. (2017) "Green water on a fixed model in a large wave basin: flow velocity, void fraction, and impact pressure distributions." *36<sup>th</sup> International Conference on Ocean, Offshore and Arctic Engineering*, Trondheim, Norway.

- [5] Chuang, W.-L., Chang, K.-A., and Mercier, R. (2016) "Impact pressure, void fraction, and green water velocity due to plunging breaking wave impingement on a 2d tension-leg structure." *35<sup>th</sup> International Conference on Ocean, Offshore and Arctic Engineering*, Busan, South Korea.
- [6] Chuang, W.-L., Chang, K.-A., and Mercier, R. (2015) "Application of dam-break flow solution to predict the green water velocity on a 2d tension-leg platform." *25<sup>th</sup> International Ocean and Polar Engineering Conference*, Kona, Big Island, Hawaii, USA.
- [7] Chuang, W.-L., Chang, K.-A., and Mercier, R. (2015) "Void fraction and impact pressure caused by breaking wave impingement on a 2d tension-leg structure." *25<sup>th</sup> International Ocean and Polar Engineering Conference*, Kona, Big Island, Hawaii, USA.
- [8] Chuang, W.-L., Chang, K.-A., and Mercier, R. (2014) "Experimental modeling of breaking wave impingement on a tension-leg platform." *24<sup>th</sup> International Ocean and Polar Engineering Conference*, Busan, South Korea.
- [9] Chuang, W.-L., Hsiao, S.-C., Wu, H.-R., and Wu, T.-R. (2010) "Three-dimensional numerical simulation on intake model with cross flow." *17<sup>th</sup> National Computational Fluid Dynamics Conference*, Jhongli, Taiwan.
- [10] Chuang, W.-L., Hsiao, S.-C., Hwang, K.-S., and Lin, C.-P. (2009) "Numerical and experimental study of pump sump flows." *33<sup>rd</sup> Conference on Theoretical and Applied Mechanics*, Miaoli, Taiwan.

SELECTED  
LECTURES AND  
PRESENTATIONS

Chuang, W.-L. and K.-A. Chang (2017) "Pressure, force, and fluid velocity distributions due to tsunami bore impact on a simplified coastal building at various headings." *Young Coastal Scientists and Engineers Conference – North America*, Dauphin Island, AL, USA

Chuang, W.-L. (2015) "Experimental modeling of breaking wave Impingement on a tension-leg platform." *Ocean Engineering Seminar*, Texas A&M University, College Station, TX, USA.

HONORS

OMAE Outreach for Engineers Scholarship	2016
D. Michael Hughes Scholarship	2015–2016
American Bureau of Shipping Scholarship	2014–2015

PEER-REVIEW  
ACTIVITIES

Journal of Engineering Mechanics  
Coastal Engineering Journal  
International Journal of Naval Architecture and Ocean Engineering

TECHNICAL  
SOCIETY

Texas A&M Energy Research Society

EXTRA-  
CURRICULAR  
ACTIVITIES  
SECTION

Varsity baseball team in NCKU (2004-2007)  
Softball club in Taiwanese Student Association (2012-Present)