KUAN-CHUNG LIN

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EDUCATION

The Pennsylvania State University *08/2016 - 08/2020*
Ph.D. in Civil and Environmental Engineering
Minor in Computational Science Engineering
Dissertation Title: "A nodally integrated thermo-mechanical Meshfree formulation with application to fused deposition modeling."
Advisor: Dr. Michael Hillman
Focus: Computational Mechanics

National Taiwan University *09/2011 - 06/2013*
M.S. in Civil Engineering
Thesis Title: "Wave propagation of earthquake on underground tunnels."
Advisor: Dr. Yeong-Bin Yang
Focus: Structural and geotechnical earthquake engineering

National Taiwan University of Science and Technology *09/2007 - 02/2011*
B.S. in Civil and Construction Engineering

RESEARCH EXPERIENCE

Research Assistant, The Pennsylvania State University *2016 - 2020*
Civil and Environmental Engineering, (Advisor: Prof. Michael Hillman)

- Develop and validate meshfree methods for multi-fields, (thermoelasticity and thermo-viscoelasticity) and additive manufacturing (fused deposition modeling, FDM).
- Develop a novel method for solving essential boundary conditions in meshfree methods.
- Develop 3D parallel FORTRAN code with meshfree methods for land slide, soil bearing capacity, Taylor bar impacting, and earth moving problems.
- Manage a project with CNH Industrial America for the reproducing kernel particle method for geotechnical operations.
- Manage and organize group guide and 3D codes via GitLab.
- Collaborate with postdocs and group members to develop a new meshfree method for the U.S. Army Engineer Research and Development Center (ERDC).

Graduate Research Assistant, National Taiwan University *2011 - 2013*
Department of Civil and Environmental Engineering (Advisor: Prof. YB Yang)

- Developed and applied of the 2.5D finite/infinite element approach for seismic response of the soil-structure interaction.
- Managed and negotiated to order for lab consumables, equipment, and services.
- Assisted in lab maintenance and organization.
- Mentored 2 graduate students.

TEACHING EXPERIENCE

Teaching Assistant, The Pennsylvania State University *Fall 2018 - Fall 2019*
Structure Analysis (Instructor: Prof. Michael Hillman)
Design of Reinforced Concrete Structures (Instructor: Prof. Hassan El-Chabib)

- Graded problem sets and exams.
- Designed weekly lecture review.
- Designed course materials including study problems and exams.
- Presented two lectures during semester.
- Designed lab section on beam testing to class of 70 juniors for the class of the design of reinforced concrete structures.
- Presented tutorial for SAP2000.

Assistant to Graduate Mentor, National Taiwan University *Fall 2012 - Spring 2013*
Department of Civil and Environmental Engineering

- Mentored 2 students to accomplish given research guidance in coding of finite/infinite approach for soil-structural interaction.

Teaching Assistant, National Taiwan University *Fall 2012 - Spring 2013*
Stability of Structures /Advanced Mechanics of Materials (Instructor: Prof. YB Yang)

- Graded problem sets and exams.

WORK EXPERIENCE

Accreditation Specialist, Institute of Engineering Education Taiwan *2014 - 2016*

- Accreditation planning, executing, orientation for accreditation.

RESEARCH INTERESTS

Development of advanced computational methods

- Consistent essential boundary condition enforcement in Galerkin meshfree methods
- Accelerated thermo-mechanical Galerkin meshfree methods for additive manufacturing
- Variationally consistent (VC) domain integration for meshfree in thermal-mechanics
- Stabilized nodal integration for thermomechanical coupling
- 2.5D finite/infinite element approach for seismic response of the soil-structure interaction
- Combination of meshfree methods with infinite element methods for infinite domain problems

Application of computational mechanics to extreme deformation modeling

- Numerical simulation of three-dimensional deposition printing for thermoplastics
- Numerical investigation of tillage and earth-moving operations using stabilized meshfree methods
- Numerical simulation of shear band formation in landslides using stabilized meshfree methods
- Numerical simulation of fully coupled thermal-mechanics in welding with phase change (thermo-elastic, thermal visco-elastic, and thermal viscous) using stabilized meshfree methods
- Numerical investigation of crack in reinforced concrete using stabilized meshfree methods

PUBLICATIONS

Journal Publications

1 M. Hillman and **K.C. Lin**, 2020. Consistent Weak Forms for Meshfree Methods: Full realization of h-refinement, p-refinement, and a-refinement in Strong-type Essential Boundary Condition Enforcement. *Computer Methods in Applied Mechanics and Engineering*, under review.

2 **K.C. Lin** and M. Hillman, 2020. Stable and Accurate Meshfree Methods for Thermoelasticity, to be submitted.

3 **K.C. Lin** and M. Hillman, 2020. Numerical Modeling of Non-Newtonian Fluid with Heat Conduction using Explicit Semi-lagrangian RKPM, to be submitted.

4 **K.C. Lin**, H.H. Huang, J.P. Yang, Y.B. Yang, 2016. Seismic Analysis of Underground Tunnels by the 2.5D Finite/ Infinite Element Approach, *Soil Dynamic and Earthquake Engineering*, Vol. 85, pp.31-43. URL

5 Y.B. Yang, H.H. Hung, **K.C. Lin**, K.W. Cheng, 2015. Dynamic Response of Elastic Half Space with Cavity Subjected to P and SV Waves by Finite/ Infinite Element Approach, *International Journal of Structural Stability and Dynamics*, Vol. 15(7), 1540009. URL

Conference Papers

1 M. Hillman, **K.C. Lin**, A. Madra, 2019. The Meshfree Explicit Galerkin Analysis (MEGA) Code.*14ème Colloque National en Calcul des Structures*, 1-9. URL

PRESENTATIONS AND POSTERS

Conference Presentations

1 **Lin, K. C.**, Hillman, M., "Naturally stabilized nodal integration for meshfree methods in thermoelasticity," 15th US National Congress of Computational Mechanics, Austin, Texas, July 28 - August 1, 2019.

2 Hillman, M., **Lin, K. C**., Madra, A., "The meshfree explicit Galerkin analysis (MEGA) code," 14‘eme Colloque National en Calcul des Structures, Presqu’ˆıle de Giens, France, May 13-17, 2019.

3 **Lin, K. C.**, Hillman, M., "Consistent strong enforcement of essential boundary conditions in meshfree methods," 2018 International Mechanical Engineering Congress and Exposition, Pittsburgh, Pennsylvania, November 9-15, 2018.

4 **Lin, K. C.**, Hillman, M., "Consistent strong enforcement of essential boundary conditions in meshfree methods," USACM Thematic Workshop on Meshfree and Particle Methods: Application and Theory, Santa Fe, New Mexico, September 10-12, 2018.

5 **Lin, K. C.**, Hillman, M. "Consistent strong enforcement of the essential boundary conditions," Abstract, 13th Workd Congress on Computational Mechanics (WCCM2018), New York City, July 22-27, 2018.

6 **Lin, K. C.**, Hillman, M., "Consistent strong enforcement of essential boundary conditions in meshfree methods," 2018 Engineering Mechanics Institute Conference, Boston, Massachusetts, May 29 - June 1, 2018.

Posters

1 **Lin, K. C.**, Hillman, M., "Consistent strong enforcement of essential boundary conditions in meshfree methods," USACM Thematic Workshop on Meshfree and Particle Methods: Application and Theory, Santa Fe, New Mexico, September 10-12, 2018

TECHNICAL SKILLS

Programming Languages
Python, Julia, Fortran, C/C++, MATLAB.

Code Development Experience
Finite element method, 2.5D finite and infinite element approach, thermomechanical coupling, and meshfree methods, written in parallel computing of FORTRAN, MATLAB and Python.

Software & Tools
HTML, LaTeX, Microsoft, GitLab, Mathematica, ParaView, Abaqus, AutoCAD, SAP2000, SketchUp, Trelis.

UNIVERSITY SERVICE

Department

- Member, Civil and Environmental Engineering Safety Committee, 2019

AWARDS AND CERTIFICATIONS

Awards

- **Travel Award**, United States Association for Computational Mechanics, 2018.
- **Fellowship Award**, National Taiwan University of Science and Technology, 2007 - 2011.
- Ranked No.**2** for M.S. in Civil Engineering, National Taiwan University.
- Ranked No.**1** for B.S. in Civil and Construction Engineering, National Taiwan University of Science and Technology.
- **President's Awards**, National Taiwan University of Science and Technology.
- **First Place**, National High School Skills Competition: surveying.