

Jiarui Wang, Ph.D

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🌐 <https://wangmeshfree.github.io/group>

Research Interests

Fundamental Development of Advanced Computational Methods

- Computational mechanics of solids and thin-wall structures
- Unification of non-local correspondence peridynamics to the classical local continuum model
- Stable time integration algorithms for Petrov-Galerkin, collocation, and finite volume methods
- Upwind meshfree collocation method for convection dominant problems
- Superconvergent strong form collocation methods for arbitrary order PDEs

Application of Computational Mechanics to Real World Engineering Problems

- Stable and accurate meshfree methods for the shell structures design
- Stable and accurate meshfree methods for material failure and extreme deformations
- Immersed volumetric method for composite problems with arbitrary inclusion topology
- Stable time integration algorithms for damage analysis of high-strength concrete
- Highly efficient meshfree method for 3D concrete printing

Education

The Pennsylvania State University

Ph.D. in Civil Engineering, Advisor: Prof. Michael Hillman

University Park, USA

08.2018 – 08.2021

- Stabilized meshfree methods for material failure and composite analysis

Xiamen University

M.S. in Engineering Mechanics, Advisor: Prof. Dongdong Wang

Xiamen, CHINA

08.2015 – 06.2018

- Superconvergent meshfree collocation methods

Inner Mongolia University

B.S. in Civil Engineering

Hohhot, CHINA

09.2010 – 06.2015

Experience

Southern University of Science and Technology

Assistant Professor in the Department of Mechanics and Aerospace Engineering

Shenzhen, Guangdong, China

10.2024 -

Brown University

Hibbitt postdoctoral research fellow with Prof. Yuri Bazilevs

Providence, RI, USA

07.2022 - 09.2024

The Pennsylvania State University

Postdoctoral scholar with Prof. Michael Hillman

University Park, PA, USA

10.2021 - 06.2022

The Pennsylvania State University

Graduate research assistant







University Park, PA, USA

Fall 2018 - Summer 2021


Academic Publications: Google Scholar Citations(as of 2024/10/23): 290

Before joining SUSTech:


2024:

14. H. Cheng, A. Radlińska*, M. Hillman, F. Liu, **J. Wang**, "Modeling concrete deposition via 3D printing using reproducing kernel particle method", *Cement and Concrete Research*, vol. 181, p. 107526, 2024. 
13. **J. Wang***, M. Hillman, D. Wilmes, J. Magallanes, Y. Bazilevs, "Smoothed naturally stabilized RKPM for non-linear explicit dynamics with novel stress gradient update", *Computational Mechanics*, 2024, doi: 10.1007/s00466-024-02494-0 . 
12. **J. Wang**, Y. Bazilevs*, "A general-purpose meshfree Kirchhoff–Love shell formulation", *Engineering with Computers*, 2024, doi.org/10.1007/s00366-024-01989-x. 
11. **J. Wang**, M. Behzadinasab, W. Li, and Y. Bazilevs*, "A stable formulation of correspondence-based peridynamics with a computational structure of a method using nodal integration", *International Journal for Numerical Methods in Engineering*, 125(11):e7465, 2024. 
10. **J. Wang***, and M. Hillman, "Upwind reproducing kernel collocation method for convection-dominated problems", *Computer Methods in Applied Mechanics and Engineering*, vol. 420, p. 116711, 2024. 
9. H. Nguyen, **J. Wang**, Y. Bazilevs*, "A smooth Crack-Band model for anisotropic materials: continuum theory and computations with the RKPM meshfree method", *International Journal of Solids and Structures*, vol. 288, p. 112618, 2024. 



2022:

8. **J. Wang**, and M. Hillman*, "Temporal stability of collocation, Petrov-Galerkin, and other non-symmetric methods in elastodynamics and an energy conserving time integration", *Computer Methods in Applied Mechanics and Engineering*, vol. 393, p. 114738, 2022. 



2021:

7. **J. Wang**, G. Zhou, M. Hillman*, A. Madra, Y. Bazilevs, J. Du, and K. Su, "Consistent immersed volumetric Nitsche methods for composite analysis", *Computer Methods in Applied Mechanics and Engineering*, vol. 385, p. 114042, 2021. 

2020:

6. **J. Wang**, J. Wu, and D. Wang*, "A quasi-consistent integration method for efficient meshfree analysis of Helmholtz problems with plane wave basis functions", *Engineering Analysis with Boundary Element*, vol. 110, pp. 42–55, 2020. 
5. D. Wang*, **J. Wang**, and J. Wu, "Arbitrary order recursive formulation of meshfree gradients with application to superconvergent collocation analysis of Kirchhoff plates", *Computational Mechanics*, vol. 65, no. 3, pp. 877–903, 2020. 


2019:

4. D. Wang*, **J. Wang**, J. Wu, J. Deng, and M. Sun, "A three-dimensional two-level gradient smoothing meshfree method for rainfall induced landslide simulations" , *Frontiers of Structural and Civil Engineering*, vol. 13, no. 2, pp. 337–352, 2019. 
3. L. Deng, D. Wang*, **J. Wang**, and J. Wu, "A gradient smoothing Galerkin meshfree method for thin plate analysis with linear basis function" , *Chinese Journal of Theoretical and Applied Mechanics*, vol. 51, no. 3, p. 690, 2019. 

2018:

2. D. Wang*, **J. Wang**, and J. Wu, "Superconvergent gradient smoothing meshfree collocation method" , *Computer Methods in Applied Mechanics and Engineering*, vol. 340, pp. 728–766, 2018. 

2016:

1. J. Wu, J. Deng, **J. Wang**, and D. Wang*, "A review of numerical integration approaches for Galerkin meshfree methods" , *Chinese Journal of Solid Mechanics*, vol. 37, pp. 208–233, 2016. 

Awards

▪ USNCCM17 Conference Travel Award	2023
▪ Hibbitt Postdoc Fellow, School of Engineering, Brown University	2023
▪ Hibbitt Postdoc Fellow, School of Engineering, Brown University	2022
▪ USNCCM16 Student Conference Award	2021
▪ Excellent Master Thesis of Fujian Province	2018

Professional Services

Peer Review of Manuscripts

- Reviewer, Computer Methods in Applied Mechanics and Engineering (CMAME) (1)
- Reviewer, Engineering with Computers (EWCO) (1)
- Reviewer, Engineering Analysis with Boundary Elements (3)
- Reviewer, Calcolo (2)
- Reviewer, Scientific Report (1)

Teaching

▪ Lecturer at Brown University ENGN 0040: Dynamics and Vibrations, 180 enrolled, rating 4.26/5.	Spring 2024
▪ Teaching Assistant at Brown University Computational Methods in Structural Mechanics, 6 enrolled, rating 5/5.	Fall 2023
▪ Guest lecturer at The Pennsylvania State University Design of Concrete Structures	Spring 2022
▪ Guest lecturer at The Pennsylvania State University Meshfree method and computational solid mechanics	Spring 2019
▪ Teaching Assistant at Xiamen University Finite element analysis	Spring 2018

- **Teaching Assistant** at Xiamen University
Material mechanics
- **Teaching Assistant** at Xiamen University
Statics and dynamics

Fall 2017

Spring 2017

Conference Presentations

Presenter

- **J. Wang**, Y. Bazilevs, "A naturally stabilized reproducing kernel particle Kirchhoff-Love shell formulation for nonlinear explicit dynamics", **Advances in Computational Mechanics (ACM)**, Austin, TX, OCT 22 - OCT 25, 2023.
- **J. Wang**, Y. Bazilevs, "Naturally stabilized correspondence peridynamics", 17th U. S. National Congress on Computational Mechanics (**USNCCM**), Albuquerque, NM, July 22 - July 28, 2023.
- **J. Wang**, M. Hillman, "Temporal Stability of Collocation, Petrov-Galerkin and Other Non-symmetric Method in Elastodynamics and an Energy Conserving Time Integration", 15th World Congress on Computational Mechanics (**WCCM**) and 8th Asian Pacific Congress on Computational Mechanics, Yokohama, Virtual July 31 - August 5, 2022.
- **J. Wang**, M. Hillman, "Temporal Stability of Collocation, Petrov-Galerkin and Other Non-symmetric Method in Elastodynamics and an Energy Conserving Time Integration", 19th U.S. National Congress on Theoretical and Applied Mechanics (**USNC/TAM**), Austin, June 19-24, 2022.
- **J. Wang**, M. Hillman, "An upwind reproducing kernel collocation method for convection-dominated problems", Engineering Mechanics Institute Conference (**EMI**), Baltimore May 31 - June 3, 2022.
- **J. Wang**, M. Hillman, "A Naturally Stabilized Conforming Nodal Integration for Nonlinear Explicit Dynamics", International Mechanical Engineering Congress and Exposition (**IMECE**), Virtual, Nov 1-5, 2021.
- **J. Wang**, M. Hillman, "Consistent immersed volumetric Nitsche methods for composite analysis", 16th International Conference on Computational Plasticity (**COMPLAS**), Hybrid, Sep 7-9, 2021.
- **J. Wang**, M. Hillman, "A Lagrangian Naturally Stabilized Meshfree Method", 16th U.S. National Congress on Computational Mechanics (**USNCCM**), Virtual, July 25-29, 2021.
- **J. Wang**, M. Hillman, "A hybrid Lagrangian/semi-Lagrangian meshfree formulation for efficient simulation of extreme deformation problems", Engineering Mechanics Institute Conference (**EMI**), Virtual, May 25-28, 2021.
- M. Hillman, **J. Wang**, "The reproducing kernel finite volume method for elastodynamics", Engineering Mechanics Institute Conference (**EMI**), Virtual, May 25-28, 2021.
- **J. Wang**, M. Hillman, "A Lagrangian naturally stabilized meshfree method for dynamic simulations", International Mechanical Engineering Congress and Exposition (**IMECE**), Virtual, Nov 16-19, 2020.
- M. Hillman, **J. Wang**, G. Zhou, A. Madra, "An immersed volumetric Nitsche's approach for composites with application to direct numerical simulation of micro-CT Images", International Mechanical Engineering Congress and Exposition (**IMECE**), Salt Lake City, UT, Nov 11-14, 2019