

Michael Hillman, Ph.D.

L. Robert and Mary L. Kimball Assistant Professor
Department of Civil and Environmental Engineering
The Pennsylvania State University

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Education

2013 **Ph.D.**, Civil Engineering, University of California, Los Angeles.

Dissertation topic: An Arbitrary Order Variationally Consistent Integration Method for Galerkin Meshfree Methods (Advisor: Professor J. S. Chen)

Focus: Computational Mechanics

2009 **M.S.**, Civil Engineering, University of California, Los Angeles.

Focus: Structural and geotechnical earthquake engineering

2008 **B.S.**, Civil Engineering, California State University, Fullerton.

Appointments

2016-present **L. Robert and Mary L. Kimball Assistant Professor**, The Pennsylvania State University

Department of Civil and Environmental Engineering

2014-2016 **Postdoctoral Scholar**, University of California, San Diego

Department of Structural Engineering (Advisor: J. S. Chen)

2014-2016 **Instructor**, University of California, San Diego

Department of Structural Engineering

2013 **Postdoctoral Scholar**, University of California, Los Angeles

Department of Civil and Environmental Engineering (Advisor: J. S. Chen)

2013 **Instructor**, University of California, Los Angeles

Department of Civil and Environmental Engineering

2009-2013 **Graduate Student Researcher**, University of California, Los Angeles

Department of Civil and Environmental Engineering

2011-2012 **Teaching Assistant**, University of California, Los Angeles

Department of Civil and Environmental Engineering

Research Interests

Development of advanced computational methods

- Meshfree formulations for fragment-impact and geomechanics simulations
- Variationally consistent (VC) domain integration for meshfree and isogeometric analysis
- Stabilized nodal integration for linear and large deformation problems
- Meshfree formulation for plates and shells using variationally consistent domain integration
- Accelerated Galerkin meshfree methods for extreme deformation analysis
- Stabilized Galerkin meshfree methods for convection-dominated problems in fluid mechanics
- Domain integration in Galerkin methods for convection-dominated problems in fluid mechanics
- Consistent essential boundary condition enforcement in Galerkin meshfree methods
- Unification frameworks for non-local and local meshfree methods
- High-order non-local meshfree methods
- Physics-based shock modeling in local and non-local meshfree methods
- Finite volume meshfree methods for linear and nonlinear mechanics
- Accelerated thermo-mechanical Galerkin meshfree methods for additive manufacturing
- Immersed volumetric meshfree methods for composite analysis and fluid-structure interaction

Application of computational mechanics to material failure and extreme deformation modeling

- Computational damage assessment of solids and structures under man-made disasters, such as penetration modeling, using stabilized meshfree methods
- Numerical investigation of damage processes and failure mechanisms of concrete walls and steel panels with varying wall thickness and impact velocities
- Numerical simulation of shear band formation in landslides using stabilized meshfree methods
- Numerical investigation of shock wave propagation in reinforced concrete beams subjected to blast
- Numerical investigation of tillage and earth-moving operations using stabilized meshfree methods
- Numerical simulation of three-dimensional deposition printing (concrete, thermoplastics)
- Numerical investigation of failure mechanisms in composite materials (concrete, polymer-ceramic) with direct image-based meshfree modeling of micro-CT scans

Teaching Experience

Penn State Meshfree Methods & Computational Solid Mechanics (new course developed), Finite Element Analysis, Structural Analysis

UCSD Algorithms and Programming for Structural Engineering, Structural Analysis

UCLA Introduction to Computing for Civil Engineers

Research Grants

2019-2021 Prototype of an enhanced and validated discrete-continuum particle method for microstructural failure simulation in high-performance concrete (PI: M. Hillman)
Funding Source: U.S. Army Engineer Research and Development Center
Total awarded: \$300,000

2019-2020 Enhanced reproducing kernel particle method: Variationally consistent naturally stabilized nodal integration (PI: M. Hillman)
Funding Source: Karagozian and Case, Inc.
Total awarded: \$72,698

2018-2021 An integrated computational-experimental approach to three-dimensional fracture in polymer-ceramic composites (PI: M. Hillman, Co-PI: J. Du)
Funding Source: The National Science Foundation
Total awarded: \$545,418

2019 Benchmarking the reproducing kernel particle method for geotechnical operations (PI: M. Hillman)
Funding Source: Case New Holland America LLC
Total awarded: \$59,995

2019 Evaluation of concrete materials performance in aging structures (PI: A. Siad, Co-PI: M. Hillman)
Funding Source: The Johns Hopkins University Applied Physics Laboratory LLC
Total awarded: \$34,900

2018-2019 A discrete continuum particle method for understanding micro-structural failure of concrete (PI: M. Hillman)
Funding Source: U.S. Army Engineer Research and Development Center
Total awarded: \$103,995

2018-2019 Development and experimental validation of variational collocation meshfree simulation of fracture of nanoparticle toughened composite materials (PI: M. Hillman, co-PI: C. Bakis)
Funding Source: Penn State
Total awarded: \$60,000

Publications

Journal publications and book chapters

1. Hillman, M., Pasetto, M., Zhou, G., Generalized reproducing kernel peridynamics: Unification of local and non-local meshfree methods, non-local derivative operations, and an arbitrary-order state-based peridynamic formulation, *Computational Particle Mechanics*, 2019, [doi:10.1007/s40571-019-00266-9](https://doi.org/10.1007/s40571-019-00266-9).
2. Zhou, G., Hillman, M., A Non-ordinary state-based Godunov peridynamics formulation for strong shocks in solids, *Computational Particle Mechanics*, 2019, [doi:10.1007/s40571-019-00254-z](https://doi.org/10.1007/s40571-019-00254-z).
3. Chen, J. S., Huang, T.-H., Wei, H., Hillman, M., RKPM2D: An open-source implementation of nodally integrated reproducing kernel particle method for solving partial differential equations, *Computational Particle Mechanics*, 2019, [doi:10.1007/s40571-019-00272-x](https://doi.org/10.1007/s40571-019-00272-x).
4. Khaghani, M., Rajabipour, F., Gholizadeh-Vayghan, A., Hillman, M., Characterization of viscoelastic behavior of synthetic alkali-silica reaction gels, *Cement and Concrete Composites*, Vol 104, pp. 103359, 2019, [doi:10.1016/j.cemconcomp.2019.103359](https://doi.org/10.1016/j.cemconcomp.2019.103359).
5. Hillman, M., Chen, J. S., Performance comparison of nodally Integrated Galerkin meshfree methods and nodally collocated strong form meshfree methods, In: *Advances in Computational Plasticity Vol. 46*, Eugenio Oñate, Djordje Peric, Eduardo de Souza Neto, and Michele Chiumenti (Eds.), pp. 145-164, Cham: Springer, 2018, [doi:10.1007/978-3-319-60885-3_7](https://doi.org/10.1007/978-3-319-60885-3_7).
6. Liang, S., Chen, J. S., Li, J., Lin, S. P., Roth, M. J., Heard, W., Hillman, M., Numerical investigation of statistical variation of concrete damage between scales, *International Journal of Fracture*, Vol 208(1-2), pp. 97-113, 2017, [doi:10.1061/\(ASCE\)EM.1943-7889.0001176](https://doi.org/10.1061/(ASCE)EM.1943-7889.0001176).
7. Bazilevs, Y., Moutsanidis, G., Bueno, J., Kamran, K., Kamensky, D., Hillman, M., Gomez, H., Chen, J.S., A new formulation for air-blast fluid structure interaction using an immersed approach. Part II: Coupling of IGA and meshfree discretizations, *Computer Methods in Applied Mechanics and Engineering*, Vol. 60(1), pp. 101-116, 2017, [doi:10.1007/s00466-017-1395-2](https://doi.org/10.1007/s00466-017-1395-2).
8. Chen, J. S., Hillman, M., Chi, S. W., Meshfree methods: progress made after 20 years, *Journal of Engineering Mechanics*, Vol. 143(4), pp. 04017001, 2017, [doi:10.1061/\(ASCE\)EM.1943-7889.0001176](https://doi.org/10.1061/(ASCE)EM.1943-7889.0001176).
9. Chen, J. S., Liu, W. K., Hillman, M., Chi, S. W., Lian, Y., Bessa, M. A., Reproducing kernel particle method for solving partial differential equations, In: *Encyclopedia of Computational Mechanics Second Edition*, Erwin Stein, Renè de Borst and Tom Hughes (Eds.), Volume 2, Chapter 17, London: Wiley, 2017.
10. Hillman, M., Chen, J. S., An implicit gradient meshfree formulation for convection-dominated problems, In: *Advances in Computational Fluid-Structure Interaction and Flow Simulation*, Yuri Bazilevs and Kenji Takizawa (Eds.), pp. 25-37, Cham: Springer, 2016, [doi:10.1007/978-3-319-40827-9_3](https://doi.org/10.1007/978-3-319-40827-9_3)
11. Hillman, M., Chen, J. S., An accelerated, convergent and stable nodal integration in Galerkin meshfree methods for linear and nonlinear mechanics, *International Journal for Numerical Methods in Engineering*, Vol. 107, pp. 603-630, 2016. [doi:10.1002/nme.5183](https://doi.org/10.1002/nme.5183).
12. Hillman, M., Chen, J. S., Nodally integrated implicit gradient reproducing kernel particle method for convection dominated problems, *Computer Methods in Applied Mechanics and Engineering*, Vol. 299, pp. 381-400, 2016. [doi:10.1016/j.cma.2015.11.004](https://doi.org/10.1016/j.cma.2015.11.004).
13. Haoyan W., Chen, J. S., Hillman, M., A stabilized nodally integrated meshfree formulation for fully coupled hydro-mechanical analysis of fluid-saturated porous media, *Computers and Fluids*, 2015, [doi:10.1016/j.compfluid.2015.11.002](https://doi.org/10.1016/j.compfluid.2015.11.002).

14. Sherburn, J., Roth, M. J., Chen, J. S., Hillman, M., Meshfree modeling of concrete slab perforation using a reproducing kernel particle impact and penetration formulation, *International Journal of Impact Engineering*, Vol. 86, pp. 96-110, 2015, [doi:10.1016/j.ijimpeng.2015.07.009](https://doi.org/10.1016/j.ijimpeng.2015.07.009).
15. Hillman, M., Chen, J. S., Bazilevs, Y., Variationally consistent domain integration for isogeometric analysis, *Computer Methods in Applied Mechanics and Engineering*, Vol. 284, pp. 521-540, 2015, [doi:10.1016/j.cma.2014.10.004](https://doi.org/10.1016/j.cma.2014.10.004).
16. Hillman, M., Chen, J. S., Stabilized and variationally consistent nodal integration for meshfree modeling of impact problems, *Computational Particle Mechanics*, Vol. 1, pp. 245-256, 2014, [doi:10.1007/s40571-014-0024-5](https://doi.org/10.1007/s40571-014-0024-5).
17. Chen, J. S., Hillman, M., Rüter, M., An arbitrary order variationally consistent method for Galerkin meshfree methods, *International Journal for Numerical Methods in Engineering*, Vol. 95, pp. 387-418, 2013, [doi:10.1002/nme.4512](https://doi.org/10.1002/nme.4512).
18. Rüter, M., Hillman, M., Chen, J. S., Corrected stabilized non-conforming nodal integration in meshfree methods, In: *Lecture Notes in Computational Science and Engineering VI*, Michael Griebel and Marc Alexander Schweitzer (Eds.), pp. 75-93, Cham: Springer., 2013, [doi:10.1007/978-3-642-32979-1_5](https://doi.org/10.1007/978-3-642-32979-1_5).

Conference papers

1. Gao, J., Man, R., Wang, Y., Tang, Y., Su, K., Hillman, M., Du, J., Fracture mechanisms of epoxy-alumina composites. *Proceedings of The Minerals, Metals & Materials Society 2020 Annual Meeting & Exhibition*, 2020, accepted.
2. Hillman, M., Lin, K. C., Madra, A., The meshfree explicit Galerkin analysis (MEGA) code. *Proceedings of 14ème Colloque National en Calcul des Structures*, 2019.
3. Madra, A., Du, J., Hillman, M., Multi-scale reduced-order model of composite microstructure based on X-ray micro-CT imaging. *Proceedings of 14ème Colloque National en Calcul des Structures*, 2019.
4. Littlewood, D., Hillman, M., Yreux, E., Bishop, J., Chen, J.S., Implementation and verification of RKPM in the Sierra/SolidMechanics analysis code, *Proceedings of ASME 2015 International Mechanical Engineering Congress & Exposition*, 2015.

Articles

1. Hillman, M., Chen, J. S., Roth, M. J., Advanced computational methods to understand & mitigate extreme events, *IACM Expressions* 39, 2016.
2. Chen, J. S., Hillman, M., Rüter, M., Hu, H. Y., Chi, S. W., The role of quadrature in meshfree Methods: Variational consistency in Galerkin weak form and collocation in strong form, *IACM Expressions* 34, 2014.

Presentations and Posters

Invited Talks

1. Hillman, M. "Meshfree methods for extreme deformations and material damage," Simulia Corp., Providence, Road Island, April 30, 2019.
2. Hillman, M. "Stable high-order meshfree formulations: Recent enhancements and emerging developments," Center for Extreme Events Research Summit, University of California, San Diego, San Diego, California, March 22, 2019.

3. Hillman, M. "Variational crimes in meshfree methods," Department of Mathematics Computational and Applied Mathematics Colloquium, Penn State, College Park, Pennsylvania, September 11, 2017.
4. Hillman, M. "Meshfree computational frameworks for extreme event simulation," Department of Engineering Science and Mechanics Seminar, Penn State, College Park, Pennsylvania, March 29, 2017.
5. Hillman, M. "Accelerated stabilized meshfree methods for convection dominated problems," Fluid Dynamics Research Consortium Seminar, Penn State, College Park, Pennsylvania, January 26, 2017.
6. Hillman, M. "Computational frameworks for damage assessment of structures subject to extreme loadings," Department of Mathematics and Statistics, University of New Mexico, Albuquerque, New Mexico, March 4, 2016.
7. Hillman, M. "Computational frameworks for damage assessment of structures subject to extreme loadings," Computer Science Research Institute, Sandia National Laboratories, Albuquerque, New Mexico, February 29, 2016.

Keynote Talks

1. Hillman, M., Chen, J. S., "Stable and robust meshfree integration for extreme event simulations," Engineering Mechanics Institute Conference, San Diego, California, June 4-7, 2017.

Conference Presentations

1. Hillman, M., Pasetto, M., Zhou, G., "Generalized reproducing kernel peridynamics," 15th International Conference on Computational Plasticity. Fundamentals and Applications, Barcelona, Spain, September 3-5, 2019.
2. Bazilevs, Y., Moutsanidis, G., Kamensky, D., Hillman, M., Chen, J. S., "Recent advances in IGA-meshfree methods for extreme events," 15th International Conference on Computational Plasticity. Fundamentals and Applications, Barcelona, Spain, September 3-5, 2019.
3. Yang, S., Hillman, M., "A reproducing kernel particle finite volume method for linear and nonlinear mechanics," 15th US National Congress of Computational Mechanics, Austin, Texas, July 28 - August 1, 2019.
4. Hillman, M., Wang, J., Zhou, G., "An immersed volumetric Nitsche's approach for meshfree analysis of composites," 15th US National Congress of Computational Mechanics, Austin, Texas, July 28 - August 1, 2019.
5. 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.
6. Madra, A., Hillman, M., Loeffler, C., Nie, X., Heard, W., Sherburn, J., "Semantically valid deep-learning classification of fracture morphology in high-strength concrete," 15th US National Congress of Computational Mechanics, Austin, Texas, July 28 - August 1, 2019.
7. Hillman, M., Zhou, G., "An immersed volumetric Nitsche's approach for meshfree analysis of composites," 2019 Engineering Mechanics Institute Conference, Pasadena, California, June 18-21, 2019.
8. Madra, A., Du, J., Hillman, M., "Multi-scale reduced-order model of composite microstructure based on X-ray micro-CT imaging," 14ème Colloque National en Calcul des Structures, Presqu'île de Giens, France, May 13-17, 2019.

9. Hillman, M., Lin, K. C., Madra, A., "The meshfree explicit Galerkin analysis (MEGA) code," 14^{ème} Colloque National en Calcul des Structures, Presqu'île de Giens, France, May 13-17, 2019.
10. Hillman, M., "A finite volume meshfree method: An elegant alternative to Galerkin implementations," Workshop on Meshfree Method and Advances in Computational Mechanics, Pleasanton, California March 10-12, 2019.
11. Yang, S., Hillman, M., "A conforming reproducing kernel finite volume method," 2018 International Mechanical Engineering Congress and Exposition, Pittsburgh, Pennsylvania, November 9-15, 2018.
12. 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.
13. Hillman, M., "Generalized reproducing kernel peridynamics," 2018 International Mechanical Engineering Congress and Exposition, Pittsburgh, Pennsylvania, November 9-15, 2018.
14. Yang, S., Hillman, M., "A finite volume reproducing kernel particle method," USACM Thematic Workshop on Meshfree and Particle Methods: Application and Theory, Santa Fe, New Mexico, September 10-12, 2018.
15. 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.
16. Baek, J., Zhou, G., Chen, J. S., Hillman, M., "Coupled shock-plasticity-damage modeling of explosive welding by RKPM," USACM Thematic Workshop on Meshfree and Particle Methods: Application and Theory, Santa Fe, New Mexico, September 10-12, 2018.
17. Hillman, M., "Generalized reproducing kernel peridynamics," USACM Thematic Workshop on Meshfree and Particle Methods: Application and Theory, Santa Fe, New Mexico, September 10-12, 2018.
18. Chen, J. S., Hillman, M., Chi, S. W., "Implicit gradient for numerical solution of PDEs," USACM Thematic Workshop on Meshfree and Particle Methods: Application and Theory, Santa Fe, New Mexico, September 10-12, 2018.
19. Zhou, G., Hillman, M., "A non-ordinary state-based Godunov-peridynamics formulation for shocks in solids," 13th World Congress in Computational Mechanics, New York, New York, July 22-27, 2018.
20. Yang, S., Hillman, M., "A reproducing kernel finite volume method," 13th World Congress in Computational Mechanics, New York, New York, July 22-27, 2018.
21. Lin, K. C., Hillman, M., "Consistent strong enforcement of essential boundary conditions in meshfree methods," 13th World Congress in Computational Mechanics, New York, New York, July 22-27, 2018.
22. Baek, J., Zhou, G., Chen, J. S., Hillman, M., "Coupled shock-plasticity-damage modeling of explosive welding by RKPM," 13th World Congress in Computational Mechanics, New York, New York, July 22-27, 2018.
23. Hillman, M., Zhou, G., "Generalized reproducing kernel peridynamics," 13th World Congress in Computational Mechanics, New York, New York, July 22-27, 2018.
24. Chen, J. S., Hillman, M., "Implicit gradient for numerical solution of PDEs," The World Congress in Computational Mechanics, New York, New York, July 22-27, 2018.
25. Chen, J. S., Hillman, M., "Performance comparison of nodally integrated Galerkin meshfree methods and nodally collocated strong form meshfree methods," 13th World Congress in Computational Mechanics, New York, New York, July 22-27, 2018.

26. Hillman, M., "A general framework for reproducing kernel peridynamics," 18th U.S. National Congress for Theoretical and Applied Mechanics, Chicago, Illinois, June 4-9, 2018.
27. Yang, S., Hillman, M., "A reproducing kernel finite volume method," 2018 Engineering Mechanics Institute Conference, Boston, Massachusetts, May 29 - June 1, 2018.
28. Lin, K. C., Hillman, M., "Consistent strong enforcement of essential boundary conditions in mesh-free methods," 2018 Engineering Mechanics Institute Conference, Boston, Massachusetts, May 29 - June 1, 2018.
29. Hillman, M., Zhou, G., "Generalized reproducing kernel peridynamics," 2018 Engineering Mechanics Institute Conference, Boston, Massachusetts, May 29 - June 1, 2018.
30. Hillman, M., Chen, J. S., "A smoothed implicit gradient reproducing kernel particle method for extreme event modelling," 14th International Conference on Computational plasticity, Barcelona, Spain, September 5-7, 2017.
31. Chen, J. S., Hillman, M., "Recent advances in accelerated and stabilized meshfree method for modeling man-made and natural disasters," *Plenary Lecture* 14th International Conference on Computational plasticity, Barcelona, Spain, September 5-7, 2017.
32. Hillman, M., Chen, J. S., "Non-conforming naturally stabilized nodal integration," 14th US National Congress of Computational Mechanics, Montréal, Canada, July 16-20, 2017.
33. Chen, J. S., Guohua, Z., Hillman, M., "A reproducing kernel particle method framework for modeling failure of solids subjected to blast loadings," 14th US National Congress of Computational Mechanics, Montréal, Canada, July 16-20, 2017.
34. Chen, J. S., Hillman, M., "Multiscale mechanics and modeling of concrete," Engineering Mechanics Institute Conference, San Diego, California, June 4-7, 2017.
35. Guohua, Z., Chen, J. S., Hillman, M., "A Riemann-SNNI Galerkin meshfree method for solid and fluid dynamics," Engineering Mechanics Institute Conference, San Diego, California, June 4-7, 2017.
36. Beckwith, F., Hillman, M., Chen, J. S., "Fragment impact modeling of concrete structures," Engineering Mechanics Institute Conference, San Diego, California, June 4-7, 2017.
37. Wei, H., Chen, J. S., Hillman, M., "RKPM formulation for fully Coupled hydro-mechanical analysis of fluid-saturated porous media," Engineering Mechanics Institute Conference, San Diego, California, June 4-7, 2017.
38. Moutsanidis, G., Bueno, J., Kamran, K., Kamensky, D., Hillman, M., Chen, J.S., Bazilevs, Y., "A new formulation for air-blast fluid-structure interaction based on an immersed isogeometric-meshfree approach," Engineering Mechanics Institute Conference, San Diego, California, June 4-7, 2017.
39. Chen, J. S., Hillman, M., Chi, S. W., "Meshfree methods: Progress made after 20 years," *Plenary Lecture*, CCCM-ISCM 2016, Hangzhou, China, October 16-20, 2016.
40. Hillman, M., Chen, J. S., "Accelerated meshfree methods under a smoothed implicit gradient framework," USACM Conference on Isogeometric Analysis and Meshfree Methods, La Jolla, California, October 10-12, 2016, 2016.
41. Zhou, G., Chen, J.S., Hillman, M., "A Riemann-SNNI Galerkin meshfree method for solid and fluid dynamics," USACM Conference on Isogeometric Analysis and Meshfree Methods, La Jolla, California, October 10-12, 2016, 2016.
42. Bueno, J., Moutsanidis, G., Kamran, K., Hillman, M., Gomez, H., Chen, J.S., Bazilevs, Y., "A new immersed isogeometric-meshfree technique for fluid-structure interaction problems involving high Mach numbers, part I," USACM Conference on Isogeometric Analysis and Meshfree Methods, La Jolla, California, October 10-12, 2016, 2016.

43. Bueno, J., Moutsanidis, G., Kamran, K., Hillman, M., Gomez, H., Chen, J.S., Bazilevs, Y., "A new immersed isogeometric-meshfree technique for fluid-structure interaction problems involving high Mach numbers, Part II," USACM Conference on Isogeometric Analysis and Meshfree Methods, La Jolla, California, October 10-12, 2016, 2016.
44. Roth, J., Sherburn, J., Beckwith, F., Hillman, M., Chen, J.S., "Application of meshfree methods to penetration and blast effects modeling," USACM Conference on Isogeometric Analysis and Meshfree Methods, La Jolla, California, October 10-12, 2016, 2016.
45. Beckwith, F., Hillman, M., Chen, J.S., "Fragment-impact modeling of concrete structures," US-ACM Conference on Isogeometric Analysis and Meshfree Methods, La Jolla, California, October 10-12, 2016, 2016.
46. Wei, H., Chen, J.S., Hillman, M., "RKPM formulation for fully coupled hydro- mechanical analysis of fluid-saturated porous media," USACM Conference on Isogeometric Analysis and Meshfree Methods, La Jolla, California, October 10-12, 2016, 2016.
47. Hillman, M., Chen, J. S., "Accelerated meshfree Methods using variationally consistent naturally stabilized nodal integration," 12th World Congress on Computational Mechanics, Seoul, Korea, July 24-29, 2016.
48. Chen, J. S., Hillman, M., Yreux, E., Zhou, G., "Fracture to damage multiscale modeling and application to extreme events simulation," *Plenary Lecture*, 12th World Congress on Computational Mechanics, Seoul, Korea, July 24-29, 2016.
49. Hillman, M., Roth, J., Slawson, T., Chen, J. S., "Modeling projectile penetration mechanics in a meshfree computational framework," Engineering Mechanics Institute Conference, Nashville, Tennessee, May 22-25, 2016.
50. Chen, J. S., Hillman, M., Yreux, "Fracture to damage multiscale modeling," (*Plenary*), Association of Computational Mechanics Taiwan Conference, Taipei, Taiwan, October 22-23, 2015.
51. Hillman, M., Chen, J. S., "Stable and efficient variationally consistent nodal integration for Meshfree Methods using Taylor expansion," 13th US National Congress of Computational Mechanics, San Diego, California, July 26-30, 2015.
52. Roth, M., Sherburn, J., Slawson, T., Chen, J.S., Hillman, M., "Modeling projectile penetration mechanics in a mesh-free computational framework," 13th US National Congress of Computational Mechanics, San Diego, California, July 26-30, 2015.
53. Chen, J. S., Yreux, E., Hillman, M., "A stabilized quasi-linear reproducing kernel particle method for modeling material damages under extreme events," 13th US National Congress of Computational Mechanics, San Diego, California, July 26-30, 2015.
54. Hu, H.Y., Chen, J. S., Hillman, M., Rüter, M., "The role of quadrature in meshfree methods," 3rd International Eurasian Conference on Mathematical Sciences and Applications (IECMSA-2014), Vienna, Austria, August 25-28, 2014.
55. Hillman, M., Chen, J. S., Bazilevs, Y., "Variationally consistent integration for meshfree And isogeometric analysis," 11th World Congress on Computational Mechanics, Barcelona, Spain, July 20-25, 2014.
56. Chen, J. S., and Hillman, M., "The role of quadrature In meshfree method: Variational consistency in Galerkin weak form and collocation in strong form," Seventh International Workshop, Meshfree Methods for Partial Differential Equations, Bonn, Germany, September 9-11, 2013.
57. Chen, J. S., Hillman, M., Rüter, M., "An arbitrary order variationally consistent domain integration method for Galerkin meshfree methods," 12th US National Congress of Computational Mechanics, Raleigh, North Carolina, July 22-25, 2013.

58. Hillman, M., Chen, J. S., "An arbitrary order variationally consistent integration method for Galerkin thin plate analysis," 12th US National Congress of Computational Mechanics, Raleigh, North Carolina, July 22-25, 2013.
59. Chen, J. S., Hillman, M., Rüter, M., "A general framework of domain integration in meshfree methods," Advances in Computational Mechanics, Omni San Diego Hotel, in San Diego, California, February 24-28, 2013.
60. Chen, J. S., Chi, S. W., Hu, H. Y., Hillman, M., Rüter, M., Yang, J. P. "Stabilized Galerkin and collocation meshfree methods: convergence, stability, and applications," Proceeding, European Congress on Computational Methods in Applied Sciences and Engineering, Vienna, Austria, September 10-14, 2012.
61. Chen, J. S., Hillman, M., Rüter, M., "A general framework of domain integration in meshfree methods," 10th World Congress on Computational Mechanics, São Paulo, Brazil, July 8-13, 2012.
62. Chen, J. S., Hillman, M., "A general framework of domain integration in Galerkin meshfree methods," 48th Annual Conference of Society of Engineering Sciences, Northwestern University, October 12-14, 2011.
63. Chen, J. S., Hillman, M., "General framework of domain integration in Galerkin meshfree methods," 6th International Workshop on Meshfree Methods for Partial Differential Equations, Bonn, Germany, October 4-6, 2011.
64. Chen, J. S., Hillman, M., "Implicit upwind reproducing kernel particle method for convection dominated problems," 11th US National Congress on Computational Mechanics, Minneapolis, USA July 25-28 2011.
65. Chen, J. S., Hillman, M., "Fragment-impact modeling using RKPM Level set kernel contact algorithms," 9th World Congress on Computational Mechanics, Sydney, Australia, July 19-23, 2010.

Posters

1. Zhou, G., Hillman, M., "Numerical methods for extreme events modeling," UCSD Jacobs School of Engineering Research Expo, San Diego, California, April 16, 2015.
2. Zhou, G., Hillman, M., Pasetto, M., Beckwith, F. "Recent advances in modeling extreme events and application to homeland security," UCSD Jacobs School of Engineering Research Expo, San Diego, California, April 16, 2015.
3. Yreux, E., Hillman, M., Zhou, G. "Meshfree methods for fragment-impact modeling and homeland security applications," UCSD Jacobs School of Engineering Research Expo, San Diego, California, April 16, 2015.
4. Yreux, E., Hillman, M. "Meshfree methods for fragment-impact modeling and homeland security applications," UCSD Jacobs School of Engineering Research Expo, San Diego, California, April 16, 2014.
5. Hillman, M., Roth, J., Chi, S. W. "Advances in meshfree methods for fragment-impact modeling and homeland security applications," UCLA Henry Samueli School of Engineering and Applied Science Tech Forum, Los Angeles, California, May 8, 2013.
6. Yreux, E., Hillman, M. "An arbitrary order variationally consistent domain integration method for galerkin thin plate analysis," 12th US National Congress of Computational Mechanics, Raleigh, North Carolina, July 22-25, 2013.
7. Hillman, M., "Implicit upwind reproducing kernel particle method for convection dominated problems," 11th US National Congress on Computational Mechanics, Minneapolis, Minnesota, July 25-28, 2011.

8. Hillman, M., Lin, S. P. "Computational mechanics for earth moving simulation," UCLA Henry Samueli School of Engineering and Applied Science Tech Forum, Los Angeles, California, March 1, 2011.

Professional Service

Conferences Committees

1. International Scientific Committee, 2020 Engineering Mechanics Institute Conference, New York, New York, May 26-29, 2020.
2. Technical Committee, Workshop on Meshfree Method and Advances in Computational Mechanics. Pleasonton, CA, March 10-12, 2019.
3. Scientific Committee, 18th United States Congress for Theoretical and Applied Mechanics. Chicago, IL., June 4-9, 2018.
4. International Scientific Committee, 2018 Engineering Mechanics Institute Conference. Cambridge, MA., May 29 - June 1, 2018).
5. Scientific Organizing Committee, Meshfree and Particle Methods: Applications and Theory, Sante Fe, New Mexico, September 10-12, 2018.
6. Scientific Committee, Computations Subcommittee, 18th U.S. National Congress for Theoretical and Applied Mechanics, Chicago, Illinois, June 4-9, 2018.
7. International Scientific Committee, 2018 Engineering Mechanics Institute Conference, Cambridge, Massachusetts, May 29-June 1, 2018.
8. International Scientific Committee, 2017 Engineering Mechanics Institute Conference, La Jolla, California, June 4-7, 2017.
9. Scientific Committee, USACM Conference on Isogeometric Analysis and Meshfree Methods, La Jolla, California, October 10-12, 2016.

Organizing Minisymposia

1. Session Organizer, "Advances and application of meshfree and particle methods", 14th World Congress in Computational Mechanics. Paris, France, July 19-24, 2020.
2. Session Organizer, "Computational modeling of natural and manmade disasters", 14th World Congress in Computational Mechanics. Paris, France, July 19-24, 2020.
3. Topic Organizer, "Recent advances and applications in meshfree and particle methods", 2019 International Mechanical Engineering Congress and Exposition. Salt Lake City, UT, November 11-14, 2019.
4. Session Organizer, "Meshfree, particle, and peridynamic methods", 15th International Conference on Computational Plasticity. Fundamentals and Applications. Barcelona, Spain, September 3-5, 2019.
5. Session Organizer, "Advances and applications in meshfree and particle methods", 15th US National Congress of Computational Mechanics. Austin, TX, July 28 - August 1, 2019.
6. Session Organizer, "Meshfree, peridynamics, and particle methods: Contemporary methods and applications", 2019 Engineering Mechanics Institute Conference. Pasadena, CA, June 18-21, 2019.
7. Session Organizer, "Robust, adaptive, high-resolution methods for unsteady flows", 20th International Conference on Fluid Flow Problems. Chicago, IL, March 31- April 3, 2019.
8. Session Organizer, "Recent advances and applications in meshfree and particle methods", 2018 International Mechanical Engineering Congress and Exposition. Pittsburgh, PA, November 9-15, 2018.
9. Session Organizer, "New trends in extreme events modeling", 13th World Congress in Computational Mechanics. New York, NY, July 22-27, 2018.

10. Focus Area Organizer, "Penetration and perforation," Meshfree and Particle Methods: Applications and Theory, Santa Fe, New Mexico, September 10-12, 2018.
11. Session Organizer, "Meshfree, peridynamics, and particle methods: Contemporary methods and applications," 2018 Engineering Mechanics Institute Conference, Cambridge, Massachusetts, May 29-June 1, 2018.
12. Session Organizer, "Simulation, prediction, and mitigation of extreme events," 2018 Engineering Mechanics Institute Conference, Cambridge, Massachusetts, May 29-June 1, 2018.
13. Session Organizer, "Meshfree and Particle Methods: New Developments and Applications," 14th US National Congress of Computational Mechanics, Montréal, Québec, Canada, July 17-20, 2017.
14. Session Organizer, "Extreme Event Modeling," 2017 Engineering Mechanics Institute Conference, La Jolla, California, June 4-7, 2017.
15. Session Organizer, "Quadrature and Stability Issues in IGA and Meshfree Methods," USACM Conference on Isogeometric Analysis and Meshfree Methods, La Jolla, California, October 10-12, 2016.

Professional Committees

1. Elected Member, United States Association for Computational Mechanics Technical Thrust Area on Novel Methods in Computational Engineering & Sciences (2019-present).
2. Elected Member, Engineering Mechanics Institute Computational Mechanics Technical Committee (2016-present).

Editorial Service

1. Editorial Board, Science Progress (2019-present).
2. Guest Editor, Computational Particle Mechanics, Thematic Issue, Meshfree and Particle Methods for Modeling Extreme Loadings (2019).
3. Editorial Board, Frontiers in Built Environment, Computational Methods in Structural Engineering Specialty Section (2018-present).

Peer Review of Manuscripts

1. Reviewer, Finite Elements in Analysis and Design (2018-present).
2. Reviewer, International Journal for Numerical Methods in Engineering (2017-present).
3. Reviewer, Computational Mechanics (2016-present).
4. Reviewer, Journal of Engineering Mechanics (2016-present).

Peer Review of Grant Proposals

1. Reviewer, Research Grants Council of Hong Kong (2019).

Memberships

1. American Society of Civil Engineers, Central Pennsylvania (2016-present)
2. Engineering Mechanics Institute (2016-present)
3. International Association of Computational Mechanics (2014-present)
4. United States Association of Computational Mechanics (2013-present)
5. American Society of Civil Engineers (2008-present)

University Service

Department

1. Member, Civil and Environmental Engineering Seminar Series Committee (2019-present).

2. Chair, Research Innovation Committee (2019-present)
3. Chair, Civil and Environmental Engineering Seminar Series Committee (2017-2019).
4. Member, Faculty Search Committee (2016, 2017, 2019).
5. Chair, PhD Candidacy Exam Committee (2017-present).
6. Member, PhD Candidacy Exam Committee (2016).

College

1. Chair, College of Engineering Research Computing Committee (2018-present).
2. Member, College of Engineering Research Computing Committee (2017-2018).

University

1. Member, Research Computing and Cyberinfrastructure Advisory Council (2018-present).
2. Member, Institute for CyberScience Coordinating Committee (2017-present).

Memberships

1. Associate member, Institute for CyberScience (2017-present).
2. Fluid Dynamics Research Consortium (2016-present).

Awards and Certifications

Awards

1. L. Robert and Mary L. Kimball Early Career Development Professorship, The Pennsylvania State University, 2019.
2. L. Robert and Mary L. Kimball Early Career Development Professorship, The Pennsylvania State University, 2016.
3. Best department poster, Jacobs School of Engineering Research Expo, 2014
4. Fellowship award, UCLA Graduate Division, 2013
5. Fellowship award, UCLA Graduate Division, 2011
6. Travel award, United States Association for Computational Mechanics, 2010

Supervised Student and Postdoctoral Scholar Awards

Students

1. Yang, S., Travel Award, United States Association for Computational Mechanics, 2018.
2. Lin, K. C., Travel Award, United States Association for Computational Mechanics, 2018.
3. Yang, S., Travel Award, American Society of Mechanical Engineers, 2018.
4. Yang, S., Travel Award, United States Association for Computational Mechanics, 2018.

Postdoctoral Scholars

1. Madra, M., Second Place in Computation/Modeling, Penn State Materials Visualization Competition, 2018.