

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
Topic: An Arbitrary Order Variationally Consistent Integration Method for Galerkin Meshfree Methods
Advisor: 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 Kimball Assistant Professor**, The Pennsylvania State University
Department of Civil and Environmental Engineering
- 2014–2016 Postdoctoral Scholar, Instructor**, University of California, San Diego
Department of Structural Engineering (Advisor: J. S. Chen)
- 2013 Postdoctoral Scholar, Instructor**, University of California, Los Angeles
Department of Civil and Environmental Engineering (Advisor: J. S. Chen)
- 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

Honors and Awards

1. CAREER Award, The National Science Foundation, 2020
2. L. Robert and Mary L. Kimball Early Career Development Endowed Professorship, The Pennsylvania State University, 2019–2022
3. L. Robert and Mary L. Kimball Early Career Development Endowed Professorship, The Pennsylvania State University, 2016–2019
4. Best Department Poster, Jacobs School of Engineering Research Expo, University of California, San Diego, 2014
5. Fellowship Award, Graduate Division, University of California, Los Angeles, 2013
6. Fellowship Award, Graduate Division, University of California, Los Angeles, 2011
7. Travel Award, US Association for Computational Mechanics, 2010

Research Interests

Development of Advanced Computational Methods

- Accelerated Galerkin meshfree methods for extreme deformation analysis
- Variationally consistent domain integration for arbitrary-order Galerkin accuracy
- Stabilized nodal integration
- Unification of local and non-local meshfree methods
- High-order non-local meshfree methods
- Physics-based shock modeling

Application of Computational Mechanics to Material Failure and Extreme Deformations

- Numerical investigation of damage processes and failure mechanisms of concrete walls and steel panels with varying thickness and impact velocities
- Numerical investigation of shock propagation in reinforced concrete members subjected to blast
- Numerical investigation of tillage and earth-moving operations
- Numerical simulation of three-dimensional deposition printing (concrete, thermoplastics)

Supervised Students and Postdoctoral Scholars

Ph.D. Dissertation Advisor

2020–present	Wang, Y.	"A cohesive reproducing kernel particle method for brittle fracture"
2020–present	Groeneveld, A.	"An immersed variational multiscale reproducing kernel particle method with application to fiber reinforcement in ultra-high performance concrete"
2020–present	Liu, F.	"Hybrid reproducing kernel peridynamic method for extreme event simulation"
2018–2021 (graduated)	Wang, J.	"Stabilized meshfree methods for material failure and composite analysis"
2017–2021 (expected)	Yang, S.	"Reproducing kernel finite volume methods for dynamic brittle fracture"
2016–2020 (graduated)	Lin, K. C.	"A nodally integrated thermo-mechanical meshfree formulation with application to fused deposition modeling"

Ph.D. Dissertation Co-advisor

2021–present	Cheng, H.	"An experimental-computational approach for the analysis of 3D printing of concrete structures"
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M.S. Dissertation Advisor

2017–2017 (graduated)	Chen, G. (co-advised)	"A numerical framework of viscoelastic modeling for 3D printable concrete simulation"
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Postdoctoral Advisor

2020–present	Wang, J.	"Immersed thermo-mechanical fluid-structure interaction for impact and penetration"
2020–present	Jafarzadeh, S.	"Fast convolution-based Galerkin meshfree methods for extreme event simulation"
2018–2020	Madra, A.	"Damage characterization and data-driven meshfree modeling of composite structures"
2017–2018	Zhou, G.	"Immersed meshfree methods for composite solid analysis and fluid-structure interaction"

Undergraduate Research Advisor

2019–2020	Wang, Y.	"Linear system solver selection in meshfree methods"
2019–2020	Cai, V.	"Parametric studies in meshfree simulations of large deformation problems"

Supervised Student and Postdoctoral Scholar Awards

Students

1. Yang, S., Harry G. Miller Fellowship In Engineering, The Pennsylvania State University, 2020
2. Yang, S., USACM Thematic Conference on Meshfree and Particle Methods Travel Award, US Association for Computational Mechanics, 2018
3. Lin, K. C., USACM Thematic Conference on Meshfree and Particle Methods Travel Award, US Association for Computational Mechanics, 2018
4. Yang, S., IMECE2018 Travel Award, American Society of Mechanical Engineers, 2018
5. Yang, S., WCCM13 Travel Award, International Association for Computational Mechanics, 2018

Postdoctoral Scholars

1. Madra, M., Second Place, Computation/Modeling, Materials Visualization Competition, The Pennsylvania State University, 2018

Teaching Experience

[§]New course developed

Penn State

Fall 2020	Graduate	The Finite Element Method (linear static and dynamic analysis)	9 students, one section
Fall 2020	Graduate	Meshfree Methods for Linear and Nonlinear Solid Mechanics [§]	11 students, one section
Spring 2020	Graduate	The Finite Element Method (linear static and dynamic analysis)	7 students, one section
Fall 2019	Undergraduate	Structural Analysis (determinate and indeterminate structures)	153 students, two sections
Spring 2019	Graduate	Meshfree Methods for Linear and Nonlinear Solid Mechanics [§]	4 students, one section
Fall 2018	Undergraduate	Structural Analysis (determinate and indeterminate structures)	155 students, two sections
Spring 2018	Graduate	The Finite Element Method (linear static and dynamic analysis)	9 students, one section
Fall 2017	Undergraduate	Structural Analysis (determinate and indeterminate structures)	60 students, one section
Spring 2017	Graduate	Meshfree Methods for Linear and Nonlinear Solid Mechanics [§]	6 students, one section
Fall 2016	Undergraduate	Structural Analysis (determinate and indeterminate structures)	82 students, one section

UCSD

Summer 2016	Undergraduate	Structural Analysis (determinate and indeterminate structures)	30 students, one section
Summer 2015	Undergraduate	Algorithms and Programming for Structural Engineering	25 students, one section
Summer 2014	Undergraduate	Algorithms and Programming for Structural Engineering	24 students, one section

UCLA

Summer 2013	Undergraduate	Introduction to Computing for Civil Engineers	11 students, one section
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Publications

†Supervised student author

‡Supervised postdoctoral author

Journal Publications

1. Wang, J.[†], Zhou, G.[‡], Hillman, M., Madra, A.[‡], Bazilevs, Y., Du, J., Su, K. Consistent immersed volumetric Nitsche methods for composite analysis, *Computer Methods in Applied Mechanics and Engineering*, Vol 385, p.114042, 2021. [Download](#).
2. Hillman, M., Lin, K. C.[†], Nodally integrated thermomechanical RKPM: Part II—Generalized thermoelasticity and hyperbolic finite-strain thermoplasticity, *Computational Mechanics*. <https://doi.org/10.1007/s00466-021-02048-8>, 2021. [Download](#).
3. Hillman, M., Lin, K. C.[†], Nodally integrated thermomechanical RKPM: Part I—Thermoelasticity, *Computational Mechanics*. <https://doi.org/10.1007/s00466-021-02047-9>, 2021. [Download](#).
4. Tang, Y., Su, K., Man, R., Hillman, M., Du, J., Investigation of internal cracks in epoxy-alumina using in situ mechanical testing coupled with micro-CT, *JOM*. <https://doi.org/10.1007/s11837-021-04714-x>, 2021 [Download](#).
5. Baek, J., Chen, J. S., Zhou, G.[‡], Arnett, K. P., Hillman, M., Hegemier, G., Hardesty, S., A semi-Lagrangian RKPM with node-based shock algorithm for explosive welding simulation, *Computational Mechanics*, Vol. 67, pp. 1601–1627, 2021. [Download](#).
6. Hillman, M., Lin, K. C.[†], 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*, Vol. 373, p. 113448, 2021. [Download](#).
7. 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*, Vol. 7, pp. 435–469, 2020. [Download](#).
8. Zhou, G.[‡], Hillman, M., A Non-ordinary state-based Godunov peridynamics formulation for strong shocks in solids, *Computational Particle Mechanics*, Vol. 7, pp. 365–375, 2020. [Download](#).
9. 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*, Vol. 7, pp. 393–433, 2020. [Download](#).
10. 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, p. 103359, 2019. [Download](#).
11. Liang, S., Chen, J. S., Li, J., Lin, S. P., Chi, S. W., Hillman, M., Roth, M. J., Heard, W., Numerical investigation of statistical variation of concrete damage between scales, *International Journal of Fracture*, Vol 208(1), pp. 97–113, 2017. [Download](#).
12. 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, *Computational Mechanics*, Vol. 60, pp. 101–116, 2017. [Download](#).
13. Chen, J. S., Hillman, M., Chi, S. W., Meshfree methods: progress made after 20 years, *Journal of Engineering Mechanics*, Vol. 143(4), p. 04017001, 2017. [Download](#).

In the top five most read papers in the Journal of Engineering Mechanics, March 2017 – January 2018. Downloaded 3,688 times as of September 9, 2021.

14. 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. [Download](#).
15. 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. [Download](#).
16. 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*, Vol. 141, pp. 105–115, 2016. [Download](#).
17. 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. [Download](#).
18. 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. [Download](#).
19. 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. [Download](#).
20. 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. [Download](#).

Book Chapters

1. 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. [Download](#).
2. 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. [Download](#).
3. 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. [Download](#).

Encyclopedia Entries

1. 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, 2018. [Download](#).

Articles

1. Chen, J. S., Chi, S. W., Hillman, M., Preface: Meshfree and particle methods for modeling extreme loadings, in memory of Steve Attaway, *Computational Particle Mechanics*, Vol. 7, pp. 173–176, 2020. [Download](#).
2. Hillman, M., Chen, J. S., Roth, M. J., Advanced computational methods to understand & mitigate extreme events, *IACM Expressions*, Vol. 39, pp. 12–16, 2016. [Download](#).
3. 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*, Vol. 34, pp. 11–17, 2014. [Download](#).

Conference Papers

1. Chen, J. S., Baek, J., Huang, T. H., Hillman, M., Accelerated and stabilized meshfree method for impact-blast modeling, proceedings, 2020 ASCE Structures Congress, St. Louis, Missouri, April 5–8, 2020. [Download](#).
2. Hillman, M., Lin, K. C.[†], Madra, A.[‡], The meshfree explicit Galerkin analysis (MEGA) code, proceedings, 14^{ème} Colloque National en Calcul des Structures, Presqu'île de Giens, May 13–17, 2019. [Download](#).
3. Madra, A.[‡], Su., K., Du, J., Hillman, M., Multi-scale reduced-order model of composite microstructure based on X-ray micro-CT imaging, proceedings, 14^{ème} Colloque National en Calcul des Structures, Presqu'île de Giens, May 13–17, 2019. [Download](#).
4. Littlewood, D., Hillman, M., Yreux, E., Bishop, J., Chen, J.S., Implementation and verification of RKPM in the Sierra/SolidMechanics analysis code, proceedings, ASME 2015 International Mechanical Engineering Congress & Exposition, Houston, Texas, November 13–19, 2015. [Download](#).

Technology Adapted in the Field

2019	Naturally Stabilized Nodal Integration CNH Industrial LLC Research adapted in the MEGA code
2019	Conforming Naturally Stabilized Nodal Integration Karagozian & Case, Inc. Research adapted in the FEMFRE code
2017	Naturally Stabilized Nodal Integration Livermore Software Technology Corp. Research adapted in the LS-DYNA code
2015	Variationally Consistent Naturally Stabilized Nodal Integration Sandia National Laboratories Research adapted in the SIERRA/SolidMechanics code
2015	Variationally Consistent Naturally Stabilized Nodal Integration U.S. Army Engineer Research and Development Center Research adapted in the NMAP code

Research Grants

Hillman has been PI/Co-PI on ten externally funded research projects (PI on nine), with total external funding \$2.1M (Hillman's share: \$1.8M).

2021–2023	STTR phase II: Enhancing thermo-mechanically coupled computational models for high-temperature impact and fracture (PI: M. Hillman) Funding Source: Karagozian and Case, Inc.; Prime: Missile Defense Agency Total awarded: \$358,228 (100% to Hillman)
2021–2022	Numerical modeling of 3D printable concrete (PI: A. Radlinska, co-PI: M. Hillman) Funding Source: Penn State Total awarded: \$60,000 (50% to Hillman)

- 2020–2021** **Enhanced reproducing kernel particle method for strong shock hydrodynamics** (PI: M. Hillman)
 Funding Source: Karagozian and Case, Inc.
 Total awarded: \$23,090 (100% to Hillman)
- 2020–2025** **CAREER: A hybrid local-nonlocal peridynamics framework to model failure across deformations and strain rates** (PI: M. Hillman)
 Funding Source: The National Science Foundation
 Total awarded: \$580,845 (100% to Hillman)
- 2019–2020** **STTR phase I: High temperature fracture mechanics** (PI: M. Hillman)
 Funding Source: Karagozian and Case, Inc.; Prime: Missile Defense Agency
 Total awarded: \$30,000 (100% to Hillman)
- 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: Integrated Solutions for Systems, Inc.; Prime: U.S. Army Engineer Research and Development Center
 Total awarded: \$300,000 (100% to Hillman)
- 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 (100% to Hillman)
- 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 (47% to Hillman)
- 2019** **Benchmarking the reproducing kernel particle method for geotechnical operations** (PI: M. Hillman)
 Funding Source: Case New Holland Industrial America LLC
 Total awarded: \$59,995 (100% to Hillman)
- 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 (35% to Hillman)
- 2018–2019** **A discrete continuum particle method for understanding microstructural failure of concrete** (PI: M. Hillman)
 Funding Source: Integrated Solutions for Systems, Inc.; Prime: U.S. Army Engineer Research and Development Center
 Total awarded: \$103,995 (100% to Hillman)
- 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 (96% to Hillman)

Presentations and Posters

Presenter

†Supervised student author

‡Supervised postdoctoral author

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. "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.
4. 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., Lin, K. C.†, "Variationally consistent naturally stabilized thermo-mechanical mesh-free formulation," 16th U.S. National Congress on Computational Mechanics, Virtual, July 25–29, 2021.
2. 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. Yang, S.†, Hillman, M. "A regularized phase-field reproducing kernel finite volume method with application to high-strength concrete," 16th International Conference on Computational Plasticity, Barcelona, Spain, September 7–9, 2021.
2. Wang, J.†, Hillman, M. "Consistent immersed volumetric Nitsche methods for composite analysis," 16th International Conference on Computational Plasticity, Barcelona, Spain, September 7–9, 2021.
3. Hillman, M., Lin, K. C.†, "Nodally integrated thermo-mechanical RKPM with application to simulation of additive manufacturing," 16th International Conference on Computational Plasticity, Barcelona, Spain, September 7–9, 2021.
4. Yang, S.†, Hillman, M., "A discontinuous cohesive reproducing kernel finite volume method for brittle fracture simulation," 16th U.S. National Congress on Computational Mechanics, Virtual, July 25–29, 2021.
5. Wang, J.†, Hillman, M., "A Lagrangian naturally stabilized meshfree method," 16th U.S. National Congress on Computational Mechanics, Virtual, July 25–29, 2021.
6. Wang, J.†, Hillman, M. "A hybrid Lagrangian/semi-Lagrangian meshfree formulation for efficient simulation of extreme deformation problems," 2021 Engineering Mechanics Institute Conference, Virtual, May 25–28, 2021.
7. Hillman, M., Wang, J.†, "The reproducing kernel finite volume method for elastodynamics," 2021 Engineering Mechanics Institute Conference, Virtual, May 25–28, 2021.
8. Hillman, M., "Instabilities in Petrov-Galerkin methods for elastodynamics," 14th World Congress in Computational Mechanics, Virtual, January 11–15, 2021.
9. Hillman, M., Yang, S.†, "A reproducing kernel finite volume method for elastodynamics," 14th World Congress in Computational Mechanics, Virtual, January 11–15, 2021.

10. Madra, A.[‡], Hillman, M., "Reduced-order model of concrete microstructure based on X-ray microtomographic imaging," 14th World Congress in Computational Mechanics, Virtual, January 11–15, 2021.
11. Hillman, M., Wang, J.[†], Zhou, G.[‡], Madra, A.[‡], "An immersed volumetric Nitsche's approach for composites with application to direct numerical simulation of micro-CT Images," International Mechanical Engineering Congress and Exposition 2020, Virtual, November 16–19, 2020.
12. Yang, S.[†], Hillman, M. "A cohesive reproducing kernel finite volume method for brittle fracture simulation," International Mechanical Engineering Congress and Exposition 2020, Virtual, November 16–19, 2020.
13. Wang, J.[†], Hillman, M. "A smoothed Lagrangian naturally stabilized meshfree method for dynamic simulations," International Mechanical Engineering Congress and Exposition 2020, Virtual, November 16–19, 2020.
14. Wang, Y.[†], Hillman, M. "Complexity and accuracy analysis of Galerkin and collocation meshfree methods," International Mechanical Engineering Congress and Exposition 2020, Virtual, November 16–19, 2020.
15. Gao, J., Man, R., Wang, Y., Tang, Y., Su, K., Hillman, M., Du, J. "Fracture mechanisms of epoxy-alumina composites," The Minerals, Metals & Materials Society Conference 2020, San Diego, California, February 23–27, 2020.
16. Hillman, M., Wang, J.[†], Zhou, G.[‡], Madra, A.[‡] "An immersed volumetric Nitsche's approach for composites with application to direct numerical simulation of micro-CT Images," International Mechanical Engineering Congress and Exposition 2019, Salt Lake City, UT, November 11–14, 2019.
17. Hillman, M., Pasetto, M., Zhou, G.[‡], "Generalized reproducing kernel peridynamics," 15th International Conference on Computational Plasticity, Barcelona, Spain, September 3–5, 2019.
18. 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, Barcelona, Spain, September 3–5, 2019.
19. 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.
20. 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.
21. 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.
22. 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.
23. 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.
24. 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.
25. Hillman, M., Lin, K. C.[†], Madra, A.[‡], "The meshfree explicit Galerkin analysis (MEGA) code," 14ème Colloque National en Calcul des Structures, Presqu'île de Giens, France, May 13–17, 2019.

26. 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.
27. Yang, S.[†], Hillman, M., "A conforming reproducing kernel finite volume method," 2018 International Mechanical Engineering Congress and Exposition, Pittsburgh, Pennsylvania, November 9–15, 2018.
28. 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.
29. Hillman, M., "Generalized reproducing kernel peridynamics," 2018 International Mechanical Engineering Congress and Exposition, Pittsburgh, Pennsylvania, November 9–15, 2018.
30. 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.
31. 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.
32. 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.
33. 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.
34. 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.
35. 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.
36. Yang, S.[†], Hillman, M., "A reproducing kernel finite volume method," 13th World Congress in Computational Mechanics, New York, New York, July 22–27, 2018.
37. 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.
38. 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.
39. Hillman, M., Zhou, G.[‡], "Generalized reproducing kernel peridynamics," 13th World Congress in Computational Mechanics, New York, New York, July 22–27, 2018.
40. Chen, J. S., Hillman, M., "Implicit gradient for numerical solution of PDEs," 13th World Congress in Computational Mechanics, New York, New York, July 22–27, 2018.
41. 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.
42. 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.
43. Yang, S.[†], Hillman, M., "A reproducing kernel finite volume method," 2018 Engineering Mechanics Institute Conference, Boston, Massachusetts, May 29 – June 1, 2018.

44. 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.
45. Hillman, M., Zhou, G.[‡], "Generalized reproducing kernel peridynamics," 2018 Engineering Mechanics Institute Conference, Boston, Massachusetts, May 29 – June 1, 2018.
46. Chen, J. S., Hillman, M., Chi, S. W., "Meshfree methods: Progress made after 20 years and future directions," *Plenary Lecture*, 2018 Engineering Mechanics Institute Conference, Boston, Massachusetts, May 29 – June 1, 2018.
47. 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.
48. 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.
49. Hillman, M., Chen, J. S., "Non-conforming naturally stabilized nodal integration," 14th US National Congress of Computational Mechanics, Montréal, Canada, July 16–20, 2017.
50. Chen, J. S., Zhou, G.[‡], 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.
51. Chen, J. S., Hillman, M., "Multiscale mechanics and modeling of concrete," 2017 Engineering Mechanics Institute Conference, San Diego, California, June 4–7, 2017.
52. Zhou, G.[‡], Chen, J. S., Hillman, M., "A Riemann-SNNI Galerkin meshfree method for solid and fluid dynamics," 2017 Engineering Mechanics Institute Conference, San Diego, California, June 4–7, 2017.
53. Beckwith, F., Hillman, M., Chen, J. S., "Fragment impact modeling of concrete structures," 2017 Engineering Mechanics Institute Conference, San Diego, California, June 4–7, 2017.
54. 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.
55. Moutsanidis, G., Bueno, J., Kamran, K., Kamensky, D., Hillman, 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.
56. Chen, J. S., Hillman, M., Chi, S. W., "Meshfree methods: Progress made after 20 years," *Plenary Lecture*, Chinese Conference on Computational Mechanics 2016, Hangzhou, China, October 16–20, 2016.
57. 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.
58. 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.
59. 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.

60. 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.
61. 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.
62. 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.
63. 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.
64. 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.
65. 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.
66. Hillman, M., Roth, J., Slawson, T., Chen, J. S., "Modeling projectile penetration mechanics in a meshfree computational framework," 2016 Engineering Mechanics Institute Conference, Nashville, Tennessee, May 22–25, 2016.
67. Chen, J. S., Hillman, M., Yreux, "Fracture to damage multiscale modeling," *Plenary Lecture*, Association of Computational Mechanics Taiwan Conference, Taipei, Taiwan, October 22–23, 2015.
68. Hillman, M., Chen, J. S., "Stable and efficient variationally consistent nodal integration for mesh-free methods using Taylor expansion," 13th US National Congress of Computational Mechanics, San Diego, California, July 26–30, 2015.
69. 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.
70. 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.
71. 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, Vienna, Austria, August 25–28, 2014.
72. 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.
73. 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.
74. 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.

75. 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.
76. Chen, J. S., Hillman, M., Rüter, M., "A general framework of domain integration in meshfree methods," Advances in Computational Mechanics, San Diego, California, February 24–28, 2013.
77. 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," European Congress on Computational Methods in Applied Sciences and Engineering, Vienna, Austria, September 10–14, 2012.
78. 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.
79. 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.
80. 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.
81. 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.
82. 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.

Workshops

1. Chen, J.S., Hillman, M. Introduction to meshfree methods: Fundamentals and application," Virtual, July 13—August 12, 2020.
2. Chen, J.S., Hillman, M. Introduction to meshfree methods: Fundamentals and application," San Diego, CA, May 13–May 15, 2019.

Posters

1. Zhou, G., Hillman, M., "Numerical methods for extreme events modeling," Penn State IndustryXchange, State College, Pennsylvania, May 24, 2017.
2. Zhou, G., Hillman, M., "Numerical methods for extreme events modeling," UCSD Jacobs School of Engineering Research Expo, San Diego, California, April 16, 2015.
3. 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.
4. 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.
5. 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.
6. 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.
7. 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.

8. 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.
9. 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. Member, International Scientific Committee, 16th US National Congress of Computational Mechanics, Virtual, July 25–29, 2021
2. Member, International Scientific Committee, 2021 Engineering Mechanics Institute Conference, Virtual, May 25–28, 2021
3. Member, Technical Committee, Workshop on Meshfree Method and Advances in Computational Mechanics, Pleasanton, California, March 10–12, 2019
4. Member, Scientific Committee, 18th US Congress for Theoretical and Applied Mechanics, Chicago, Illinois, June 4–9, 2018
5. Member, International Scientific Committee, 2018 Engineering Mechanics Institute Conference, Cambridge, Massachusetts, May 29 – June 1, 2018
6. Member, Scientific Organizing Committee, Meshfree and Particle Methods: Applications and Theory, Santa Fe, New Mexico, September 10–12, 2018
7. Member, Scientific Committee, Computations Subcommittee, 18th U.S. National Congress for Theoretical and Applied Mechanics, Chicago, Illinois, June 4–9, 2018
8. Member, International Scientific Committee, 2017 Engineering Mechanics Institute Conference, La Jolla, California, June 4–7, 2017
9. Member, Scientific Committee, USACM Conference on Isogeometric Analysis and Meshfree Methods, La Jolla, California, October 10–12, 2016

Organizing Minisymposia

1. Invited Session Organizer, "Extreme Events," Meshfree and Novel Finite Elements with Applications, Berkeley, California, September 25–27, 2022
2. Session Organizer, "Simulation-based Disaster Prediction and Mitigation," 15th World Congress in Computational Mechanics, Yokohama, Japan, July 31–August 5, 2022
3. Session Organizer, "Advances and Applications of Meshfree and Particle Methods," 15th World Congress in Computational Mechanics, Yokohama, Japan, July 31–August 5, 2022
4. Session Organizer, "Advances and Applications of Meshfree and Particle Methods," 19th U.S. National Congress on Theoretical and Applied Mechanics. Austin, Texas, June 19–24, 2022
5. Invited Topic Organizer, "Recent Advances and Applications in Meshfree and Particle Methods," 2021 International Mechanical Engineering Congress and Exposition, Virtual, November 1–5, 2021
6. Invited Session Organizer, "Meshfree, Peridynamics, and Particle Methods: Contemporary Methods and Applications," 16th International Conference on Computational Plasticity, Barcelona, Spain, September 7–10, 2021
7. Session Organizer, "Recent Advances and Applications in Meshfree and Particle Methods," 16th US National Congress of Computational Mechanics, Virtual, July 25–29, 2021
8. Session Organizer, "Meshfree, Peridynamic, and Particle Methods: Contemporary Methods and Applications," 2021 Engineering Mechanics Institute Conference, Virtual, May 25–28, 2021

9. Session Organizer, "Advances and Application of Meshfree and Particle Methods," 14th World Congress in Computational Mechanics, Virtual, January 11–15, 2021
10. Session Organizer, "Computational Modeling of Natural and Manmade Disasters," 14th World Congress in Computational Mechanics, Virtual, January 11–15, 2021
11. Invited Topic Organizer, "Recent Advances and Applications in Meshfree and Particle Methods," 2020 International Mechanical Engineering Congress and Exposition, Virtual, November 16–19, 2020
12. Topic Organizer, "Recent Advances and Applications in Meshfree and Particle Methods," 2019 International Mechanical Engineering Congress and Exposition, Salt Lake City, Utah, November 11–14, 2019
13. Session Organizer, "Meshfree, Particle, and Peridynamic Methods," 15th International Conference on Computational Plasticity, Barcelona, Spain, September 3–5, 2019
14. Session Organizer, "Advances and Applications in Meshfree and Particle Methods," 15th US National Congress of Computational Mechanics, Austin, Texas, July 28–August 1, 2019
15. Session Organizer, "Meshfree, Peridynamics, and Particle Methods: Contemporary Methods and Applications," 2019 Engineering Mechanics Institute Conference, Pasadena, California, June 18–21, 2019
16. Session Organizer, "Robust, Adaptive, High-Resolution Methods For Unsteady Flows," 20th International Conference on Fluid Flow Problems, Chicago, Illinois, March 31–April 3, 2019
17. Session Organizer, "Recent Advances and Applications in Meshfree and Particle Methods," 2018 International Mechanical Engineering Congress and Exposition, Pittsburgh, Pennsylvania, November 9–15, 2018
18. Invited Focus Area Organizer, "Penetration and Perforation," Meshfree and Particle Methods: Applications and Theory, Santa Fe, New Mexico, September 10–12, 2018
19. Session Organizer, "New Trends in Extreme Events Modeling," 13th World Congress in Computational Mechanics, New York, New York, July 22–27, 2018
20. Session Organizer, "Meshfree, Peridynamics, and Particle Methods: Contemporary Methods and Applications," 2018 Engineering Mechanics Institute Conference, Cambridge, Massachusetts, May 29–June 1, 2018
21. Session Organizer, "Simulation, Prediction, and Mitigation of Extreme Events," 2018 Engineering Mechanics Institute Conference, Cambridge, Massachusetts, May 29–June 1, 2018
22. Session Organizer, "Meshfree and Particle Methods: New Developments and Applications," 14th US National Congress of Computational Mechanics, Montréal, Québec, Canada, July 17–20, 2017
23. Session Organizer, "Extreme Event Modeling," 2017 Engineering Mechanics Institute Conference, La Jolla, California, June 4–7, 2017
24. Invited Session Organizer, "Quadrature and Stability Issues in IGA and Meshfree Methods," US-ACM Conference on Isogeometric Analysis and Meshfree Methods, La Jolla, California, October 10–12, 2016

Professional Committees

1. Elected Member, US 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. Associate Editor, Computer Modeling in Engineering and Sciences (2020–present)
2. Editorial Board, Science Progress (2019–present)

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

Peer Review of Manuscripts

1. Reviewer, Computational Mechanics (10)
2. Reviewer, Computer Methods in Applied Mechanics and Engineering (5)
3. Reviewer, International Journal for Numerical Methods in Engineering (5)
4. Reviewer, Journal of Engineering Mechanics (4)
5. Reviewer, Finite Elements in Analysis and Design (1)
6. Reviewer, Computers and Geotechnics (1)

Peer Review of Grant Proposals

1. Reviewer, The National Science Foundation (1 panel)
2. Reviewer, The Research Grants Council of Hong Kong (2 proposals)

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. US Association of Computational Mechanics (2013–present)
5. American Society of Civil Engineers (2008–present)

University Service

Department

1. Member, Strategic Planning Committee, (2021–present)
2. Member, Faculty Search Committee (2021–present)
3. Member, Graduate Program Committee (2020–present)
4. Member, Seminar Series Committee (2019–2020)
5. Chair, Research Innovation Committee (2019–2020)
6. Member, Faculty Search Committee (2019–2020)
7. Chair, Seminar Series Committee (2017–2019)
8. Member, Faculty Search Committee (2017–2018)
9. Member, Faculty Search Committee (2016–2017)

College

1. Chair, College of Engineering Research Computing Committee (2018–2020)
2. Member, College of Engineering Research Computing Committee (2017–2018)

University

1. Member, Institute for Computational and Data Sciences 2020 Symposium Planning Committee (2019–2020)
2. Member, Research Computing and Cyberinfrastructure Advisory Council High-performance Working Group (2018–present)
3. Member, Institute for Computational and Data Sciences Coordinating Committee (2017–present)

Memberships

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