

David T. Ma

College of Engineering
University of Hawaii at Mānoa
2540 Dole Street
Honolulu, HI 96822



Education

- Ph.D. Mechanical Engineering, University of California, Santa Barbara, [REDACTED]
- M.S. Electrical and Computer Engineering, University of California, Santa Barbara, [REDACTED]
- M.S. Mechanical Engineering, University of Science and Technology, Beijing, [REDACTED]
- B.S. Naval Architecture, Shanghai Jiao Tong University, [REDACTED]

Employment

- Interim Associate Dean, College of Engineering, University of Hawaii at Mānoa, 2017 – present
- Professor, Department of Civil & Environmental Engineering, University of Hawaii at Mānoa, 2015 – present
- Associate Professor, Department of Civil & Environmental Engineering, University of Hawaii at Mānoa, 2010 – 2015
- Assistant Professor, Department of Civil & Environmental Engineering, University of Hawaii at Mānoa, 2005 – 2010
- Postdoctoral Research Associate, Department of Mechanical & Environmental Engineering, University of California, Santa Barbara, 2003 – 2005
- Research Assistant, Department of Mechanical & Environmental Engineering, University of California, Santa Barbara, 1999 – 2003
- Head of Design Group, Erzhong Heavy Machinery Corporation, Sichuan, China, 1996 – 1999
- Structural Engineer, Erzhong Heavy Machinery Corporation, Sichuan, China, 1991 – 1996

Research

Research Grants

1. P.I., Harvesting Kinetic Energy from Ambient Vibrations of Civil Infrastructural Systems Using Nonlinear Oscillators, NSF, \$229,995, 2008 – 2012
2. P.I., Structural health monitoring and reliability analysis of highway bridges using smart sensor technologies, HDOT, \$324,982, 2008 – 2012
3. P.I., IBRD: Structural health monitoring of Kahoma Stream Bridge, FHWA, \$350,000, 2010 – 2015
4. P.I., Structural health monitoring of Kolekole Bridge, FHWA, HDOT, \$323,000, 2013-2016
5. P.I., Structural health monitoring of Wiau Interchange: Quantification of Condition Assessment of Highway Bridges Via Data Fusion, HDOT, \$256,000, 2015-2018
6. P.I., Structural health monitoring of Umauma Bridge: Long-term Monitoring Ultrahigh Performance Concrete in Bridge Joints, HDOT, \$356,000, 2016-2019

Innovation Disclosures and Patents

T. Ma and H. Zhang, “A novel nonlinear mechanical energy harvester ”(Innovation Disclosure, 2012)

T. Ma, J. Yu, E. Ma, “A method for harvesting ambient energy based on system reconfiguration”(provisional #: 62/424,364)

T. Ma, J. Yu, and E. Ma, “An electrostatic energy harvesting device with movable liquid drops as charge carrier”(provisional #: 62/427,764)

Journal Publications

1. Zhang, H., Corr, L. and Ma, T. (2018) “Effects of electrical loads containing non-resistive components on electromagnetic vibration energy harvester performance”*Mechanical Systems and Signal Processing*, (to appear)
2. Yu, J., Ma, E. and Ma. T. (2017) “Harvesting energy from low-frequency excitations through alternate contacts between water and two dielectric materials”*Scientific Reports* 7, 17145
3. Corr, L. and Ma, T. (2016) “An estimate of spherical impactor energy transfer for mechanical frequency up-conversion energy harvester”, *AIP Advances*, 6, 085019
4. Zhang, H. and Ma, T. (2015) “Roles of the Excitation in Harvesting Energy from Vibrations”*PLoS ONE*, 10(10): e0141299. doi:10.1371/journal.pone.0141299Vibrations”
5. Zhang, H. and Ma, T. (2015) “Period-one rotating solutions of horizontally excited pendulum based on Iterative Harmonic Balance”, *Advances in Pure Mathematics*, 5, 413-427. DOI: 10.4236/apm.2015.58041.
6. Ma, T., Bell, M. S., Lu, W. and Xu, N. S. (2014) “Recovering Structural Displacements and Velocities from Acceleration Measurements”, *Smart Structures and Systems*, 14(2), 191-207, DOI: <http://dx.doi.org/10.12989/sss.2014.14.2.191>
7. Ma, T. and Zhang, H. (2014) “Reaping the full potential of nonlinear energy harvesting with tunable damping and modulation of the forcing functions”, *Applied Physics Letters*, 104, 214104, DOI: 10.1063/1.4879846
8. Zhang, H. and Ma, T. (2012) “Iterative Harmonic Balance for Period-One Rotating Solution of Parametric Pendulum”, *Nonlinear Dynamics*, 70, 2433-2444, DOI: 10.1007/s11071-012-0631-8
9. Ma, T. and Zhang, H. (2012) “Enhancing Mechanical Energy Harvesting with Dynamics Escaped from Potential Well”, *Applied Physics Letters* 100(11), 114107
10. Ma, T., Xu, N. S. and Zhang, H. (2012). “A novel parametrically excited nonlinear energy harvester”, *Mechanical Systems and Signal Processing*, 28(4), 323–332, DOI:10.1016/j.ymssp.2012.01.017
11. Ma, T. (2011). “Opportunities of Using Nonlinear Oscillators to Enhance Energy Harvesting from Impulsively Loaded Structures”, *Journal of Systems and Control Engineering* 225(4), 467–474 DOI: 10.1177/2041304110394563
12. Sebastijanovic, N., Yang, H. T.Y. and Ma, T. (2010). “Detection of Changes in Global Structural Stiffness Coefficients Using Acceleration Feedback”, *Journal of Engineering Mechanics*, ASCE, 136 (9), 1187-1191
13. Ma, T., Johansen, J., Xu, N., and Yang, H. T. Y. (2010). “Improved Decentralized Method for Control of Building Structures under Seismic Excitation”, *Journal of Engineering Mechanics*, ASCE 136 (5) 662 – 673
14. Ma, T. (2010). “Almost Sure Stability Condition of Weakly Coupled Two-DOF Linear Nonautonomous Random Systems” *Applied Mathematics and Mechanics* 31 (8) 1–6
15. Labou, M. and Ma, T. (2009). “Lyapunov Exponents of Parametrically Coupled Linear Two-DOF Stochastic Systems and Related Stability Problems”, *Journal of Sound and Vibration* 325, 421–435
16. Iu, C. K., Chen, W. F., Chen, S. L., and Ma, T. (2008). “Direct Second-order Elastic Analysis for Steel Frame Design”, *KSCE Journal of Civil Engineering* 12(6), 379–389
17. Ma, T., Xu, N. S, and Tang, Y. (2008). “Decentralized Robust Control of Building Structures Under Seismic Excitations”, *Earthquake Engineering and Structural Dynamics* 37 (1), 121–140.

18. Sebastijanovic, N., Ma, T. and Yang, H. T. Y. (2007). "Finite Element Study of Panel Flutter Detection and Control", *AIAA Journal* 45(1), 118 – 127
19. Ma, T. and Yang, H. T. Y., (2006). "Sampled-data Adaptive Structural Control with Time Delays", *Journal of Structural Engineering, ASCE* 132(7), 1129–1138
20. Ma, T., Yang, H. T. Y. and Chang, C. C, (2005). "Structural Component Damage Diagnosis under Seismic Excitations", *Journal of Engineering Mechanics, ASCE* 131(10), 1036 – 1045
21. Wroblewski, M. S., Ma, T. and Yang, H. T. Y., (2004). "Modeling of Structural Accelerations and Application to Controller Design" *Journal of Earthquake Engineering* 8 (6), 947–961
22. Ma, T. and Yang, H. T. Y., (2004). "Adaptive Feedback-Feedforward Control of Building Structures", *Journal of Engineering Mechanics, ASCE* 130 (7), 786 – 793.

Other Publications

1. Zhang, H. and Ma, T. W. "New insights into vibration-based energy harvesting", *Proceedings of SPIE*, March 2015, San Diego, CA, USA
2. Bell, M. and Ma, T. W. "Recovering bridge deflections from collocated acceleration and strain measurements", *Proceedings of SPIE*, March 2015, San Diego, CA, USA
3. Zhang, H. and Ma, T. W. "Scavenging Energy From Ambient Vibrations Using Nonlinear Oscillators with Asymmetrical Potential Well", *ASCE Earth and Space Conference*, October 2014, St. Louis, USA
4. Lu, W., Xu, N. X., and Ma, T. W. "Internal-Model Kalman Filtering for Structural Deflection Estimate", *The first International Congress on Advances in Structural Engineering and Mechanics*, September 2011, Seoul, Korea
5. Lu, W., Xu, N. X., and Ma, T. W. "Bridge Deflection Monitoring Based on Acceleration Measurements", *International Symposium On Innovation & Sustainability Of Structures In Civil Engineering*, October 28-30, 2011, Xiamen, China
6. Yu, X.C., Ma, T. W., and Falzarano, J. M. "Application of A New Semi-active Control Strategy to Dynamic Response Control of An Offshore Platform Using MR Dampers", *Proceedings of the ASME 9th International Conference on Ocean, Offshore, and Arctic Engineering, OMAE* June 6-11, 2010, Shanghai, China
7. Ma, T. W., Xu, N. S., and Zhang, H. "A Novel Vibration-based Energy Harvester Using Pendulum-generator System", *Proceedings of the ASCE Earth and Space Conference*, March 16-18, 2010 Honolulu, HI (invited)
8. Ma, T. W., Xu, N. S., and Zhang, H. "A Low-frequency Vibration-based Energy Harvester Utilizing Parametrical Resonance" *Proceedings of the 5th International Workshop on Energy Harvesting*, March 3-5, 2010 Blacksburg, VA
9. Ma, T. W. and Labou, M. "On Energy Harvesting Using Nonlinear Oscillators", *Proceedings of Annual NSF Awardees Conference*, June 2009, Honolulu, HI
10. Zhang, L. M., Ma, T. W., Liu, X. L., and Chen, W. F. "Vulnerability of Framed Structures with Existing Localized Damage" *Proceedings of The 14th World Conference on Earthquake Engineering*, August 2008, Beijing, China
11. Iu, J., Ma, T. W., Chan, S. L., and Chen, W. F. "Integrating Design and Analysis: A System Approach", *Proceedings of CTBUH the 8th World Congress*, 2008, Dubai, India
12. Cho, S. Chan, S. L., Chen, W. F, and Ma, T. W. "Modern Simulation Based Design" *Proceedings of CTBUH the 8th World Congress*, 2008, Dubai, India
13. Zhang, L. M., Ma, T. W., Park, S. H., Liu, X. L., and Chen, W. F. "Progressive Collapse and Vulnerability of a Framed Structure Subject to a Blast Load", *Proceedings of The first International Workshop on Performance, Protection and Strengthening of Structures under Extreme Loading*, September 2007, Vancouver, Canada

14. Ma, T. W. and Xu, N. S. "Continuous Time Parameter Estimation of Multistory Buildings", *Proceedings of SPIE, Volume 6529*, March 2007, San Diego, CA
15. Han, X., He, Q., Sebastijanovic, N., Ma, T. W., Yang, H. T. Y. "Developing Hybrid Structural Health Monitoring Via Integrated Global Sensing and Local Infrared Imaging", *Proceedings of SPIE, Volume 652*, March 2007, San Diego, CA
16. Ma, T. W., Zhao, W. B., and Liu, J. M. "A MEMS Vibration Sensor Based on Mach Zehnder Interferometers", *Proceedings of SPIE, Volume 6529*, March 2007, San Diego, CA
17. Liu, J. M., Lan, Y. J., Zhou, Y., Ma, T. W., Pan, Y. J., and Gong, W. G. "Significance Evaluation of Geometric Features in Classification of Chinese Facial Images", *Proceedings of SPIE, Volume 6531*, March 2007, San Diego, CA
18. Liu, J. M., Mo, X. J., Wang, J., Ma, T. W., and Pan Y. J. "Measuring Three-Axis Force with Four-Part Tactile Sensing Technique", *Proceedings of SPIE, Volume 6529*, March 2007, San Diego, CA
19. Johansen, J., Ma, T. W. and Yang, H. T. Y. "Multi-Objective Structural Control Strategies with Pole Placement Constraints" *4th World Conference on Structural Control and Monitoring*, July 2006, San Diego, CA
20. Ma, T. W. "Digital Implementation of Real Time Structural Damage Detection and Assessment ", *the Third International Workshop on Advanced Smart Materials and Smart Structures Technology*, May 28 – 30, 2006, Tahoe, NV
21. Sebastijanovic, N., Ma, T. W., Yang, H. T. Y., and Chang, C. C. "Structural Damage Detection and Assessment Using Acceleration Feedback" *Proceedings of SPIE*, March 2006, San Diego, CA
22. Sebastijanovic, N., Ma, T. W. and Yang, H. T. Y. "Panel Flutter Detection and Control by Monitoring Eigenvectors" *Proceedings of SPIE, Vol. 5394*, March, 2005, San Diego, CA
23. Ma, T. W., Yang, H. T. Y. and Chang, C. C. "Direct Damage Diagnosis of Structural Component Using Global Vibration Response" *Proceedings of SPIE, Volume 5394*, March 2004, pp. 192–200, San Diego, CA
24. Ma, T. W., Yang, H. T. Y. and Chang, C. C "Structural Health Monitoring Using Time domain Residual Generator Technique" *Proceedings of the 4th Int. Workshop on Structural Health Monitoring*, pp. 445–452, September 2003, Palo Alto, CA
25. Ma, T. W., Wroblewski, M. S. and Yang, H. T. Y. "Improved Sensor Fault Accommodation Neural Networks for Structural Responses" *Proceedings of the First European Workshop on Structural Health Monitoring*, pp. 1099 – 1106, August 2002, Paris
26. Wroblewski, M. S., Ma, T. W. and Yang, H. T. Y. "Application and Evaluation of Sensor Fault Detection and Accommodation Neural networks on a Benchmark Structure" *Proceedings of the 3rd International Workshop on Structural Health Monitoring*, pp. 534-539, September 2001, Palo Alto, CA

Invited Talks

Harvesting Energy from Environment: Opportunities and Challenges, Duke University, 2015

Harvesting Energy from Vibrations, Shanghai Jiao Tong University, 2012

Solar Chimney – A Promising Alternative, Asian Pacific Clean Energy Summit and Expo, Honolulu, HI, September 2009

Harvesting Mechanical Energy Using Diamagnetic Materials, AFOSR MURI Workshop, Virginia Tech., Blacksburg, VA, August 2009

Harvesting Mechanical Energy from Aerospace Structures Using Diamagnetic Materials and Nonlinear Levitated Device Architecture, AFOSR, Washington D. C., April 2009

Collapse Analysis of Framed Structures Under Extreme Conditions, Department of Civil & Environmental Engineering, Princeton University, February 2008

Monitoring of Concrete Highway Bridges Using Smart Sensors, Bridge Design Branch, Hawaii Department of Transportation, February 2006

Modeling, Control, and Monitoring of Complex structures, Department of Aerospace and Mechanical Engineering, University of Notre Dame, March 2005

A Path toward Smart Structures: Modeling, Control, and Monitoring, Department of Civil & Environmental Engineering, Texas A&M University, March 2005

A Path toward Smart Structures: Modeling, Control, and Monitoring, Department of Civil & Environmental Engineering, Duke University, April 2005

Teaching

Courses Taught

CEE 381: Structural Analysis (Undergraduate)

CEE 482: Indeterminate Structures (Undergraduate)

CEE 681: Theory of Modern Structural Analysis (Graduate)

CEE 696: Structural Health Monitoring and Control (Graduate)

CEE 675: Structural Dynamics I (Graduate)

CEE 677: Introduction to Smart Structures Technology (Graduate)

Professional Activities

PE, Sichuan, China, #0600441, 1996–Present.

Jury Team Member, Hawaiian Cement 2006–Present.

Member, ASCE, AIAA, ASME, ASEE

Reviewer for *Journal of Sound and Vibration*, *ASME Journal of Vibration and Acoustics*, *ASCE Journal of Computing in Civil Engineering*, *ASCE Journal of Structural Engineering*, *ASCE Journal of Engineering Mechanics*, *International Journal of Structural Engineering and Mechanics*, *Journal of Mechanical Engineering Science*, *AIAA Journal*, *Smart Materials and Structures*, *IEEE Transactions on Automation Science and Engineering*, *Journal of Civil Engineering and Management*, *Engineering Structures*, *Ocean Engineering*, *Computer Aided Civil & Infrastructure Engineering*, etc.

NSF Review Panelist

Member, Structural Control Committee of the Technical Administrative Committee on Analysis and Computation, ASCE, September 2005 – present

Member, Data Informatics Committee, Asia-Pacific Network of Centers for Research in Smart Structures Technology (ANCRiSST), 2006 – present

Conference Session Chair

Intramural service: Served as member and Chair of various Committees at departmental, college, and university levels.

Associate Editor: *IST Transactions of Civil Engineering and Construction Management*, *IST Transactions of Mechanical Systems-Theory and Applications*, *IST Transactions of Renewable and Sustainable Energy*, *IST Transactions of Transportation Systems-Theory and Applications*

Advising

Ph.D. Students: [REDACTED] (2016), [REDACTED], (2016), [REDACTED] (2018, expected)

Ph.D. Students, Committee Members: [REDACTED]
[REDACTED]

MS Students: [REDACTED]
[REDACTED]

Postdoctoral Researchers: [REDACTED]
[REDACTED]

Last updated: January 24, 2018