Curriculum vitae (December 2024)

Mayuko NISHIO, Ph.D.

Current position

Associate professor, University of Tsukuba

Institute of Systems and Information Engineering

Research field

Structural Engineering, Applied Mechanics, Civil Engineering, Computational Mechanics, Structural Health Monitoring (SHM), Structural dynamics, Structural reliability, Seismic analysis, Uncertainty quantification, Data assimilation, Machine learning

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Education

Mar 2009: Ph.D. Department of Aeronautics and Astronautics, The University of Tokyo

Mar 2006: M.E. Department of Civil Engineering, The University of Tokyo

Mar 2004: B.E. Department of Civil Engineering, The University of Tokyo

Research positions

Apr 2019-current: Associate professor, Division of Engineering Mechanics and Energy, Institute of Systems and Information Engineering, University of Tsukuba

Apr 2011-Mar 2019: Associate professor, Dept. Civil Engineering, Yokohama National University

Apr 2010-Mar 2011: Research fellow, Dept. Civil Engineering, The University of Tokyo

June 2009-Mar 2010: Visiting scholar, Los Alamos National Laboratory, USA

Apr 2008-Mar 2010: Research fellow of Japan Society for the Promotion of Science (JSPS), Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan

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Research interests

1. Performance evaluation of existing structures considering aging effects, data assimilation, uncertainty quantification, Bayesian model updating, structural reliability, seismic fragility analysis, bridge traffic load capacity evaluation.

2. Structural health monitoring, vision-based sensing, environmental and operational effects, system identification, time-series analysis, statistical pattern recognition.

3. Surrogate modeling for performance evaluation of civil structures, Gaussian process regression, physics-informed machine learning, finite element method (FEM), model V&V.

4. AI and machine learning technologies for structural engineering, object detection, segmentation, computer vision, point cloud data, 3D model, UAV, bridge inspection.

Publications (recent and principals)

[21] Saida, T., Rashid, M., & Nishio, M. (2024). System fragility analysis of highway bridge using multi-output Gaussian process regression surrogate model. *Advances in Structural Engineering*, 13694332241291255. (doi: https://doi.org/10.1177/13694332241291255)

[20] Wang, S., & Nishio, M. (2024). Anomaly detection in structural dynamic systems via nonlinearity occurrence analysis using video data. *Mechanical Systems and Signal Processing*, 216, 111506. (doi: 10.1016/j.ymssp.2024.111506)

[19] Matono, G., Nishio, M. (2024). Deep learning-based point cloud completion at component-level for application to incomplete bridge point cloud data acquired by field measurements, *Computer-Aided Civil and Infrastructure Engineering*. (doi: 10.1111/mice.13218)

[18] Wang, S., Nishio, M. (2024). Review for structural damage evaluation from video data in disasters focusing on structrual nonlinearity : from vision-based system identification to damage detection, *Smart Structures and Systems*, 33 (4), 263-279. (doi: 10.12989/sss.2024.33.4.263)

[17] Matono, G., Nishio, M. (2024). Formulation of neural model decomposition and free surface flow reconstruction for fast mesh-free numerical simulation using deep learning. *Transactions of the Japan Society for Computational Engineering and Science*, 20241003. (In Japanese)
(doi: 10.11421/jsces.2024.20241003)

[16] Rashid, M., & Nishio, M. (2023). System fragility evaluation of a curved highway bridge structure considering multi-direction seismic excitations. *Advances in Structural Engineering*, 13694332231198136. (doi: 10.1177/13694332231198136)

[15] Saida, T., Rashid, M., Nemoto, Y., Tsukamoto, S., Asai, T., Nishio, M. (2023). CNN-based segmentation frameworks for structural component and earthquake damage determinations using UAV images, *Eearthquake Engineering and Engineering Vibration*, 22, 359–369. (doi: 10.1007/s11803-023-2174-z)

[14] Sato, K., Nishio, M. (2023). Application of vision-based strain distribution measurement to data assimilation for performance evaluation analysis of structures with local damages, *Journal of Structural Engineering, A*, Vol. 69A, 139-147. (In Japanese) (doi: 10.11532/structcivil.69A.139.)

[13] Saida, T., Nishio, M. (2023). Transfer learning Gaussian process regression surrogate model with

explainability for structural reliability analyss under variation in uncertainties, *Computers & Structures*, 281, 107014. (doi: 10.1016/j.compstruc.2023.107014)

[12] Ho, H., Nishio, M. (2022). Evaluation of dynamic impact factor of existing bridges with road surface damages based on dynamic response under traffic flow loading, *Structure and Infrastructure Engineering*. published online. (doi: 10.1080/15732479.2022.2145315)

[11] Nakamizo, T., Nishio, M. (2022). Finite element modeling with shell element from 3D point clouds of thin-walled steel structural members, *Intelligence, Informatics and Infrastructure*, Volume 3, Issue J2, 786-794. (In Japanese) (DOI : 10.11532/jsceiii.3.J2_786)

[10] Yu, W., Nishio, M. (2022). Multilevel Structural Components Detection and Segmentation toward Computer Vision-Based Bridge Inspection, *Sensors*, 22(9), 3502. (doi: 10.3390/s22093502)

[9] Ho, H., Nishio, M. (2020). Evaluation of dynamic responses of bridges considering traffic flow and surface roughness. *Engineering Structures*, 225, 111256. (doi: 10.1016/j.engstruct.2020.111256)

[8] Le, V. H., Nishio, M. (2019). Structural change monitoring of a cable-stayed bridge by time-series modeling of the global thermal deformation acquired by GPS, *Journal of Civil Structural Health Monitoring*, 9(5), pp. 689-701. (doi: 10.1007/s13349-019-00360-9)

[7] Wattana, K., Nishio, M. (2017). Application of a regression model for predicting traffic volume from dynamic monitoring data to the bridge safety evaluation, *Journal of Civil Structural Health Monitoring*, 7(4), 429-443.

[6] Nishio, M. (2017). Quality evaluation of fiber-optic strain data acquired in a long-term structural monitoring, *Sensors and Materials*, Vol.29, No.2, pp.141-152.

[5] Kuroda, R., Nishio, M. (2016/2020). Reliability assessment of an existing steel girder bridge using posterior distributions of model parameters, *Journal of JSCE ser. A1* Vol.72, No.3, pp.380-392. (Original in Japanese, English translation is published in *Journal of JSCE*, Vol. 8, pp. 241-254, 2020.)

[4] Wattana, K., Nishio, M. (2016). Traffic volume estimation in a cable-stayed bridge using dynamic responses acquired in the structural health monitoring, *Structural Control and Health Monitoring*, Vol. 24, Issue 4. (doi: 10.1002/stc.1890).

[3] Hien Van Le, Mayuko Nishio (2015). Time-series analysis of long-term GPS monitoring data considering global deformation due to air temperature changes, *Journal of Civil Structural Health Monitoring*, Vol.5, Issue 4, pp.415-425.

[2] Nishio, M., Marin, J., Fujino, Y. (2012). Uncertainty quantification of the finite element model of existing bridges for dynamic analysis, *Journal of Civil Structural Health Monitoring*, Vol.2: pp.163-173.

[1] Nishio M., Mizutani T., Takeda N. (2010). Structural shape reconstruction with consideration of reliability of distributed strain data from a Brillouin-scattering based optical fiber sensor, *Smart Materials and Structures*, Vol.19, No.3, 035011.

Conference papers (selected from recent 3 years)

Nishio, M., Sawayama, R., Kumura, T., & Kinoshita, K. (2024, June). Correlation Analysis of InSAR Displacement Data and Inspection Data towards Multiple Bridge Monitoring in Transportation Network, *In Proc. EWSHM*.

Matono, G., Nishio, M. (2023). Bridge point cloud completion using deep learning obtained in actual bridge structures. *Proc. IWSHM 2023*.

Wang, S., Nishio, M. (2023). Damage Evaluation in Earthquake Events by Nonlinearity Extraction from Video Data: Experiment Verification. *In Proc. EVACES 2023*. vol 433. https://doi.org/10.1007/978-3-031-39117-0_75

Saida, T., Rashid, M., Nishio, M. (2023). Gaussian Process Regression Surrogate Model for Seismic Vulnerability Assessment of Highway Bridge Structure System. *In Proc. EVACES 2023*, vol 433. https://doi.org/10.1007/978-3-031-39117-0_53

Nakamizo, T., Nishio, M. (2023). Finite Element Modeling of Thin-Walled Steel Structural Members from 3D Point Clouds. *In Proc. EVACES 2023*. vol 433. https://doi.org/10.1007/978-3-031-39117-0_76

Rashid, M., Nishio, M. (2023). System Fragility Analysis of a Horizontally Curved Multi-span Highway Bridge Structure. *In Proc. EVACES 2023*. Vol 433. https://doi.org/10.1007/978-3-031-39117-0_51

Okuda, T., Saida, T., Matono, G., Nishio, M.: Digital twin framework for real-time dynamic analysis visualization with detecting dynamic changes in structures properties using PINN," *Proc. SPIE 12486, Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2023*, 1248616 (18 April 2023); https://doi.org/10.1117/12.2658640

Invited talk

Nishio, M.: Capacity evaluation of existing bridges by integration of SHM data and numerical analysis, 11th International Conference on Structural Health Monitoring of Intelligent Infrastructure (SHMII-11), Montreal, Aug. 8-12, 2022. *Keynote speaker*

Others

[1] Nishio, M., Farrar, C., Hemez, F., Stull, C., Park, G., Cornwell, P., Figueiredo, E., Luscher, D.J., Worden, K. (2016): Feature Extraction for Structural Dynamics Model Validation, LA-UR-16-20151, Los Alamos National Laboratory, United States. DOI:10.2172/1235219 (Technical report of LANL)

Awards

Dec 2024: Intelligence, Informatics and Infrastructure Award for Excellent Paper (JSCE)

Dec 2022: Intelligence, Informatics and Infrastructure Award for Excellent Data (JSCE)

May 2020: JSCE Best Paper Award

May 2015: IABSE Young Engineer Contribution Award

Mar 2009: ASME/SPIE Student Best Paper Award

Mar 2006: Dean Prize of School of Engineering, The University of Tokyo

Mar 2006: Dean Prize of Dept. Civil Engineering, The University of Tokyo (*FRUICHI* Award)

Mar 2004: Dean Prize of Dept. Civil Engineering, The University of Tokyo (*TANABE* Award)

Research Grant (only PI)

2023-2026: JSPS (Japan Society for the Promotion of Science) Grant-in-Aid for Scientific Research (B) (Project #23H01487): 18,850,000 JPY in total

2021-2028: JST (Japan Science and Technology Agency) FOREST program, 49,000,000 JPY in total

2020-2023: JSPS Grant-in-Aid for Scientific Research (B) (Project #20H02229): 17,680,000 JPY in total

2017-2021: JSPS Grant-in-Aid for Young Scientists (A) (Project #17H04934): 21,190,000 JPY in total

2013-2016: JSPS Grant-in-Aid for Young Scientists (B) (Project #25820203): 4,160,000 JPY in total

2010-2013: JSPS Grant-in-Aid for Research Activity (Start-up) (Project #22860016): 2,821,000 JPY in total

Societies (principal)

- Japan Society of Civil Engineers (JSCE)
- The Japan Society for Computational Engineering and Science (JSCES)
- International Society for Structural Health Monitoring of Intelligent Infrastructure (ISHMII), Council member
- International Association of Bridge and Structural Engineering (IABSE)

Teaching courses

- Mechanics (classical mechanics, to undergrad, 2024-, University of Tsukuba)
- Advanced Reliability Engineering (to graduate, 2020-, University of Tsukuba)
- Mechanics of Materials (to undergrad, 2019-, University of Tsukuba)
- Mathematics for Civil Engineering (to undergrad, 2012-2018, Yokohama National University)
- Structural Mechanics (to undergrad, 2012-2018, Yokohama National University)
- Advanced Structural Dynamics (to graduate, 2014-2018, Yokohama National University)

Research advisor

(2020-current in University of Tsukuba)

12 graduate students including 5 international students (including MEXT scholarship students)

(2011-2019 in Yokohama National University)

23 graduate students including 4 PhD students (MEXT scholarship international students)

1 postdoc (host researcher of JSPS Postdoctoral Fellowship for Research in Japan)