



Theodore Chang

Ph.D. (Earthquake Engineering, 2020)

M.Sc. (Distinction) (Civil and Structural Engineering, 2014)

B.Eng. (Civil Engineering, 2013)

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>_ Expertises

1. numerical analysis
static and dynamic nonlinear finite element analysis of reinforced concrete, steel structures and continuum mechanics problems, isogeometric analysis
2. structural analysis and design
design and analysis of reinforced concrete, steel and timber structures
3. software engineering
high performance computation, software development on different architectures, development of new finite element models
4. applied mathematics
linear algebra, differential equation, numerical analysis, machine learning related topics

>_ Work/Lecturing Experience

- 2022 – present, Research Associate Humboldt–Universität zu Berlin.
- 2020S1 – 2021S1, Lecturer University of Canterbury.
- 2019S2 – 2019S3, Lecturer UC International College.
- 2016 – 2021, Teaching Assistant (Coordinator) University of Canterbury.

>_ Research



Research Interests

constitutive models, couple stress theory, finite element formulation, structural dynamics, isogeometric analysis



Ph.D. Thesis

L. Zhang, Numerical analysis tools for modelling reinforced concrete shear wall buildings subjected to earthquake loading, Ph.D. thesis, University of Canterbury (2020). doi : 10.26021/1833

Books

1. G. MacRae, T. L. Chang, Introduction to structural steel (2021). doi:10.5281/ZENODO.5513880
2. (WIP) Constitutive Modelling Cookbook

Journal Papers

1. T. L. Chang, C.-L. Lee, A strategy for fast evaluation of nonviscously damped systems with arbitrary kernels, Mechanical Systems and Signal Processing 210 (2024) 111156. doi:10.1016/j.ymssp.2024.111156
2. T. L. Chang, C.-L. Lee, Reformulation of concentrated plasticity frame element with N - M interaction and generalized plasticity, Journal of Structural Engineering 150 (1) (2024) 04023210. doi:10.1061/JSENDH.STENG-12176
3. M. Scheidgen, L. Himanen, A. N. Ladines, D. Sikter, M. Nakhaee, Á. Fekete, T. Chang, A. Golparvar, J. A. Márquez, S. Brockhauser, S. Brückner, L. M. Ghiringhelli, F. Dietrich, D. Lehmborg, T. Denell, A. Albino, H. Näsström, S. Shabih, F. Dobener, M. Kühbach, R. Mozumder, J. F. Rudzinski, N. Daelman, J. M. Pizarro, M. Kuban, C. Salazar, P. Ondračka, H.-J. Bungartz, C. Draxl, NOMAD: A distributed web-based platform for managing materials science research data, Journal of Open Source Software 8 (90) (2023) 5388. doi:10.21105/joss.05388
4. C.-L. Lee, T. L. Chang, A. J. Carr, Consistent assembly method for elemental damping, Computers & Structures 289 (2023) 107152. doi:10.1016/j.compstruc.2023.107152
5. W. Dong, M. Li, T. Sullivan, G. MacRae, C.-L. Lee, T. Chang, Direct displacement-based seismic design of glulam frames with buckling restrained braces, Journal of Earthquake Engineering (2022) 1–32doi:10.1080/13632469.2022.2110999
6. T. L. Chang, C.-L. Lee, New mixed formulation and mesh dependency of finite elements based on the consistent couple stress theory (Jul. 2022). arXiv:2207.02544
7. T. L. Chang, C.-L. Lee, Numerical simulation of generalised Maxwell-type viscous dampers with an efficient iterative algorithm, Mechanical Systems and Signal Processing 170 (2022) 108795. doi:10.1016/j.ymssp.2021.108795
8. T. L. Chang, C.-L. Lee, A. J. Carr, R. P. Dhakal, Numerical evaluations of a novel membrane element in response history analysis of reinforced concrete shear walls, Engineering Structures 220 (2020) 110760. doi:10.1016/j.engstruct.2020.110760
9. T. L. Chang, C.-L. Lee, A. J. Carr, R. P. Dhakal, Numerical evaluations of a novel membrane element in simulations of reinforced concrete shear walls, Engineering Structures 199 (2019) 109592. doi:10.1016/j.engstruct.2019.109592
10. T. L. Chang, C.-L. Lee, A. J. Carr, R. P. Dhakal, S. Pampanin, A new drilling quadrilateral membrane element with high coarse-mesh accuracy using a modified Hu–Washizu principle, International Journal for Numerical Methods in Engineering 119 (7) (2019) 639–660. doi:10.1002/nme.6066
11. M. Arnaiz, T. A. Cochrane, N. F. D. Ward, T. L. Chang, Facilitating universal energy access for developing countries with micro-hydropower: Insights from Nepal, Bolivia, Cambodia and the Philippines, Energy Research & Social Science 46 (2018) 356–367. doi:10.1016/j.erss.2018.07.016

Conference Papers

1. C.-L. Lee, T. L. Chang, Implementation and performance of bell-shaped damping model, in: F. Di Trapani, C. Demartino, G. C. Marano, G. Monti (Eds.), Proceedings of the 2022 Eurasian OpenSees Days, Springer Nature Switzerland, Cham, 2023, pp. 147–156. doi:10.1007/978-3-031-30125-4_13

2. C. Lee, T. Chang, Numerical evaluation of bell-shaped proportional damping model for softening structures, in: 15th World Congress on Computational Mechanics (WCCM-XV) and 8th Asian Pacific Congress on Computational Mechanics (APCOM-VIII), CIMNE, 2022.
doi:10.23967/wccm-apcom.2022.083
3. T. Chang, C.-L. Lee, A. Carr, R. Dhakal, Dynamic analysis of a reinforced concrete shear wall building using a novel finite element, in: Proceedings of the 7th International Conference on Computational Methods in Structural Dynamics and Earthquake Engineering (COMPDYN 2019), Institute of Structural Analysis and Antiseismic Research School of Civil Engineering National Technical University of Athens (NTUA) Greece, 2019, pp. 4565–4575. doi:10.7712/120119.7250.18782

➤_ Major Software Skills

Edit	L ^A T _E X, Vim, MS Office Suite
Code	C/C++, Python, Fortran, MATLAB, Go, Rust, Java
Draw	AutoCAD
Analyse	ANSYS, ABAQUS, OpenSees, SAP2000
HPC	OpenMP, MPI, SYCL
Misc.	Linux, CMake, Git, Visual Studio, VS Code, Qt

➤_ Projects

1. T. L. Chang, suanPan — an open source, parallel and heterogeneous finite element analysis framework (2021). doi:10.5281/ZENODO.1285221
2. Damping Dolphin — a utility to visualise and generate parameter sets for use in the damping model
3. Alcongrator — a utility to process and visualise ground motions
4. PB3D — a preprocessor for PB3D dynamic analysis for timber structures
5. suanPan-manual — manual for open source FEM platform suanPan
6. structmech — a TikZ command set for structural mechanics drawings

➤_ Referees

1. Dr. Chin-Long Lee
Associate Professor, University of Canterbury. chin-long.lee@canterbury.ac.nz
2. Dr. Gregory MacRae
Professor, University of Canterbury. gregory.macrae@canterbury.ac.nz
3. Dr. Rajesh Dhakal
Professor, University of Canterbury. rajesh.dhakal@canterbury.ac.nz
4. Dr. Athol Carr
Professor Emeritus, University of Canterbury. athol.carr@canterbury.ac.nz



References

- [1] L. Zhang, Numerical analysis tools for modelling reinforced concrete shear wall buildings subjected to earthquake loading, Ph.D. thesis, University of Canterbury (2020). doi:10.26021/1833.
- [2] G. MacRae, T. L. Chang, Introduction to structural steel (2021). doi:10.5281/ZENODO.5513880.
- [3] T. L. Chang, C.-L. Lee, A strategy for fast evaluation of nonviscously damped systems with arbitrary kernels, *Mechanical Systems and Signal Processing* 210 (2024) 111156. doi:10.1016/j.ymssp.2024.111156.
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- [5] M. Scheidgen, L. Himanen, A. N. Ladines, D. Sikter, M. Nakhaee, Á. Fekete, T. Chang, A. Golparvar, J. A. Márquez, S. Brockhauser, S. Brückner, L. M. Ghiringhelli, F. Dietrich, D. Lehmberg, T. Denell, A. Albino, H. Näsström, S. Shabih, F. Dobener, M. Kühbach, R. Mozumder, J. F. Rudzinski, N. Daelman, J. M. Pizarro, M. Kuban, C. Salazar, P. Ondračka, H.-J. Bungartz, C. Draxl, NOMAD: A distributed web-based platform for managing materials science research data, *Journal of Open Source Software* 8 (90) (2023) 5388. doi:10.21105/joss.05388.
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- [7] W. Dong, M. Li, T. Sullivan, G. MacRae, C.-L. Lee, T. Chang, Direct displacement-based seismic design of glulam frames with buckling restrained braces, *Journal of Earthquake Engineering* (2022) 1–32doi:10.1080/13632469.2022.2110999.
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- [12] T. L. Chang, C.-L. Lee, A. J. Carr, R. P. Dhakal, S. Pampanin, A new drilling quadrilateral membrane element with high coarse-mesh accuracy using a modified Hu-Washizu principle, *International Journal for Numerical Methods in Engineering* 119 (7) (2019) 639–660. doi:10.1002/nme.6066.
- [13] M. Arnaiz, T. A. Cochrane, N. F. D. Ward, T. L. Chang, Facilitating universal energy access for developing countries with micro-hydropower: Insights from Nepal, Bolivia, Cambodia and the Philippines, *Energy Research & Social Science* 46 (2018) 356–367. doi:10.1016/j.erss.2018.07.016.
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- [15] C. Lee, T. Chang, Numerical evaluation of bell-shaped proportional damping model for softening structures, in: *15th World Congress on Computational Mechanics (WCCM-XV) and 8th Asian Pacific Congress on Computational Mechanics (APCOM-VIII)*, CIMNE, 2022. doi:10.23967/wccm-apcom.2022.083.

- [16] T. Chang, C.-L. Lee, A. Carr, R. Dhakal, Dynamic analysis of a reinforced concrete shear wall building using a novel finite element, in: Proceedings of the 7th International Conference on Computational Methods in Structural Dynamics and Earthquake Engineering (COMPDYN 2019), Institute of Structural Analysis and Antiseismic Research School of Civil Engineering National Technical University of Athens (NTUA) Greece, 2019, pp. 4565–4575. doi:10.7712/120119.7250.18782.
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