



Theodore Chang

Ph.D. (Earthquake Engineering, 2020)

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

B.Eng. (Civil Engineering, 2013)

>_ Contact



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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](https://doi.org/10.26021/1833)

◆ Books

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

◆ Journal Papers

1. 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) 1–32 [doi:10.1080/13632469.2022.2110999](https://doi.org/10.1080/13632469.2022.2110999)
2. 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](https://arxiv.org/abs/2207.02544)
3. 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](https://doi.org/10.1016/j.ymssp.2021.108795)
4. 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](https://doi.org/10.1016/j.engstruct.2020.110760)
5. 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](https://doi.org/10.1016/j.engstruct.2019.109592)
6. 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](https://doi.org/10.1002/nme.6066)
7. 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](https://doi.org/10.1016/j.erss.2018.07.016)

◆ Conference Papers

1. 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](https://doi.org/10.23967/wccm-apcom.2022.083)
2. 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](https://doi.org/10.7712/120119.7250.18782)

>_ Major Software Skills

Edit	LaTeX, Vim, MS Office Suite
Code	C/C++, Fortran, MATLAB, Go, Rust, Python, 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](https://doi.org/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](#)
Senior Lecturer, University of Canterbury. chin-long.lee@canterbury.ac.nz
2. [Dr. Gregory MacRae](#)
Associate 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](#)
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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](https://doi.org/10.26021/1833).
- [2] G. MacRae, T. L. Chang, Introduction to structural steel (2021). [doi:10.5281/ZENODO.5513880](https://doi.org/10.5281/ZENODO.5513880).
- [3] 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) 1–32 [doi:10.1080/13632469.2022.2110999](https://doi.org/10.1080/13632469.2022.2110999).
- [4] 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](https://arxiv.org/abs/2207.02544).
- [5] 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](https://doi.org/10.1016/j.ymssp.2021.108795).
- [6] 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](https://doi.org/10.1016/j.engstruct.2020.110760).
- [7] 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](https://doi.org/10.1016/j.engstruct.2019.109592).
- [8] 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](https://doi.org/10.1002/nme.6066).
- [9] 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](https://doi.org/10.1016/j.erss.2018.07.016).
- [10] 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](https://doi.org/10.23967/wccm-apcom.2022.083).
- [11] 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](https://doi.org/10.7712/120119.7250.18782).
- [12] T. L. Chang, suanPan — an open source, parallel and heterogeneous finite element analysis framework (2021). [doi:10.5281/ZENODO.1285221](https://doi.org/10.5281/ZENODO.1285221).