

Exponent®
Engineering & Scientific Consulting

Astrid Winther Fischer, Ph.D., P.E.

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Professional Profile

Dr. Astrid W Fischer specializes in seismic response of buildings, numerical modeling, and collapse simulation of wind turbine towers. Her work has focused on the seismic design of steel deck diaphragms which resulted in updated design recommendations in AISI S310 and ASCE 7-22. Her work included advanced numerical modeling and failure analysis of multi-layered spiral-welded wind turbine towers. Dr. Fischer's areas of expertise include earthquake engineering, structural dynamics, structural stability, cold-formed steel design, topology optimization, finite element methods and analysis, and nonlinear structural analysis.

Prior to joining Exponent, Dr. Fischer was a postdoctoral fellow and graduate research assistant at Johns Hopkins University, where she earned her doctorate in Civil Engineering. During her postdoctoral work, she led research efforts on advanced modeling of multi-layered spiral-welded wind turbine towers using Abaqus software. She addressed the challenge of modeling the bond between the layers of the tower, conducted buckling analysis, and performed full material and geometric nonlinear analysis, incorporating eigen mode and spiral-weld imperfections. In her doctoral dissertation, Dr. Fischer conducted an extensive parametric study using OpenSEES, examining the impact of wall and diaphragm stiffness and strength on the seismic response of buildings. She also utilized topology optimization to enhance diaphragm designs and investigated the improved design's non-linear response and behavior past yield in comparison to traditional diaphragms.

Dr. Fischer has consulted on projects related to assessing causes of damage and investigating construction defects and code compliance issues of buildings and structures.

Academic Credentials & Professional Honors

Ph.D., Civil Engineering, Johns Hopkins University, 2021

M.S., Mechanical Engineering, Johns Hopkins University, 2020

M.S., Civil Engineering, Johns Hopkins University, 2020

M.S., Civil Engineering, Technical University of Denmark, 2016

B.S., Civil Engineering, Technical University of Denmark, 2014

Licenses and Certifications

Professional Engineer Civil and Structural, California, #97819

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Academic Appointments

Postdoctoral Fellow at Ralph O'Connor Sustainable Energy Institute at Johns Hopkins University, 2022-2023

Publications

Fischer, A.W. and B.W. Schafer, Wall-Diaphragm Interactions in Seismic Response of Building Systems I: Parametric Models and Elastic Response, Earthquake Engineering & Structural Dynamics, 2023. https://doi.org/10.1002/eqe.3836

Fischer, A.W. and B.W. Schafer, Wall-Diaphragm Interactions in Seismic Response of Building Systems II: Inelastic Response and Design, Earthquake Engineering & Structural Dynamics, 2023. https://doi.org/10.1002/eqe.3829

Sadowski, A.J., M. Seidel, A.W. Fischer, et. al, 8-MW wind turbine tower computational shell buckling benchmark Part 1: An international 'round-robin' exercise, Engineering Failure Analysis, 2023. https://doi.org/10.1016/j.engfailanal.2023.107124

Fischer, A.W., J.K. Guest and B.W. Schafer, Topology Optimization of Steel Deck Building Diaphragms, Journal of Constructional Steel Research, Volume 191, 2022. https://doi.org/10.1016/j.jcsr.2022.107186

Fischer, A.W. and B.W. Schafer, Wall-Diaphragm Interactions in Seismic Response of Single-Story Building Systems, Engineering Structures, Volume 247, 2021. https://doi.org/10.1016/j.engstruct.2021.113150

Presentations

Fischer, A.W., F. Ferrari, J.K. Guest and B.W. Schafer, Design of Orthotropic Steel Diaphragms for Improved Building Stability through Topology Optimization, Annual Stability Conference/NASSCC: The Steel Conference - April 12-16, 2021.

Fischer, A.W., J.K. Guest and B.W. Schafer, Topology Optimization of Cold-Formed Steel Deck Diaphragms with Irregularities, CFSRC Colloquium, Baltimore, Maryland, USA - October 20-21, 2020.

Fischer, A.W. Force and Ductility Demands Found in Parametric Study of Inelastic Time History Analysis of Single-Story Mass-Spring Model, Cold-Formed Steel Research Consortium (CFSRC) Summer Symposium - May 26-27, 2020, https://cfsrc.org/2020/05/27/sharing-success-at-cfsrc-symposium

Fischer, A.W., J.K. Guest and B.W. Schafer, Novel Building Diaphragm Layouts Generated through Topology Optimization, 14th Nordic Steel Construction Conference, Copenhagen, Denmark - September 18-20, 2019.

Fischer, A.W., J.K. Guest and B.W. Schafer, Generation of Novel Building Diaphragm Layouts through Topology Optimization, 12th Canadian Conference on Earthquake Engineering, Quebec, Canada - June 17-20, 2019.

Fischer, A.W. and B.W. Schafer, Inelastic Time History Response of Lumped Parameter Wall and Diaphragm Building, 11th National Conference on Earthquake Engineering, Los Angles, California - June 25-29, 2018

Fischer, A.W., B.W. Schafer, G. Bian Warping and Deformations in Profiled Steel Deck under Shear, Annual Stability Conference/NASSCC: The Steel Conference, Baltimore, Maryland - April 10-13, 2018.

Fischer, A.W. and B.W. Schafer, Impact of Fabrication Tolerances for Cold-Formed Steel Section

Properties, Stability, and Strength, Annual Stability Conference/NASSCC: The Steel Conference, Orlando, Florida - April 13-15, 2016.