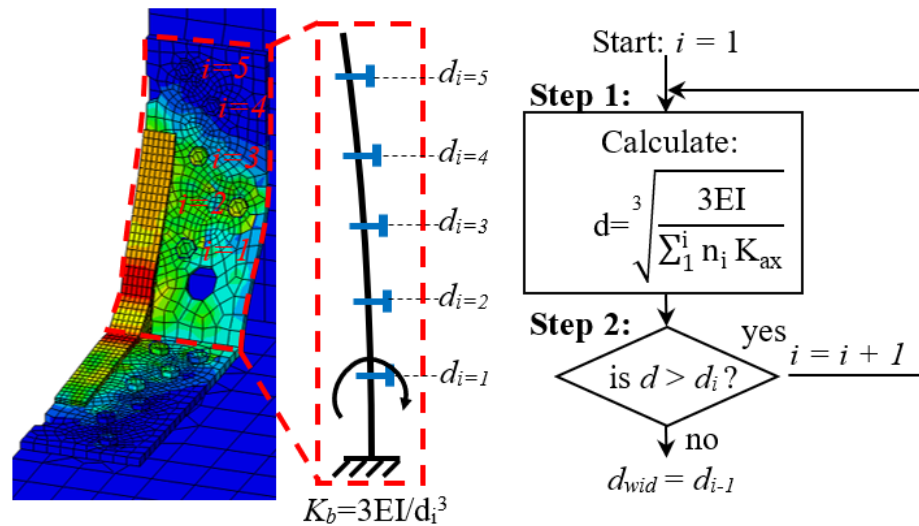


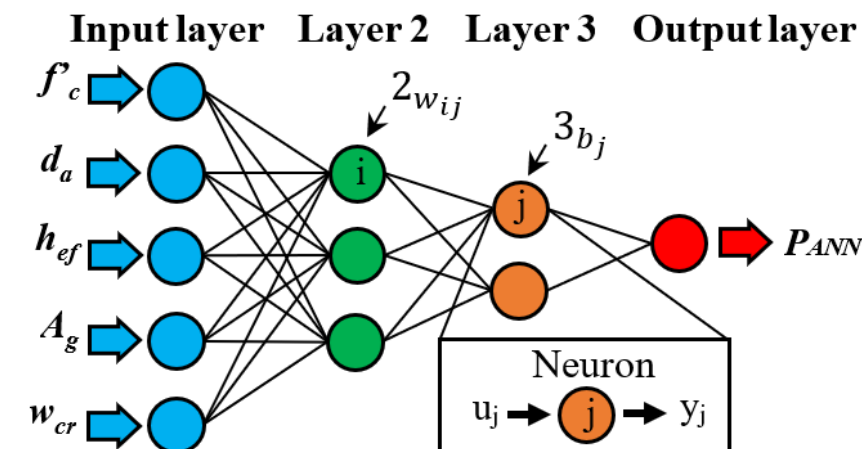
## Cross Laminated Timber

- Out of plane behavior
- Wall-to-floor/foundation connections
- Response to earthquake-tsunami
- Resiliency and sustainability aspects
- Life cycle assessment methods



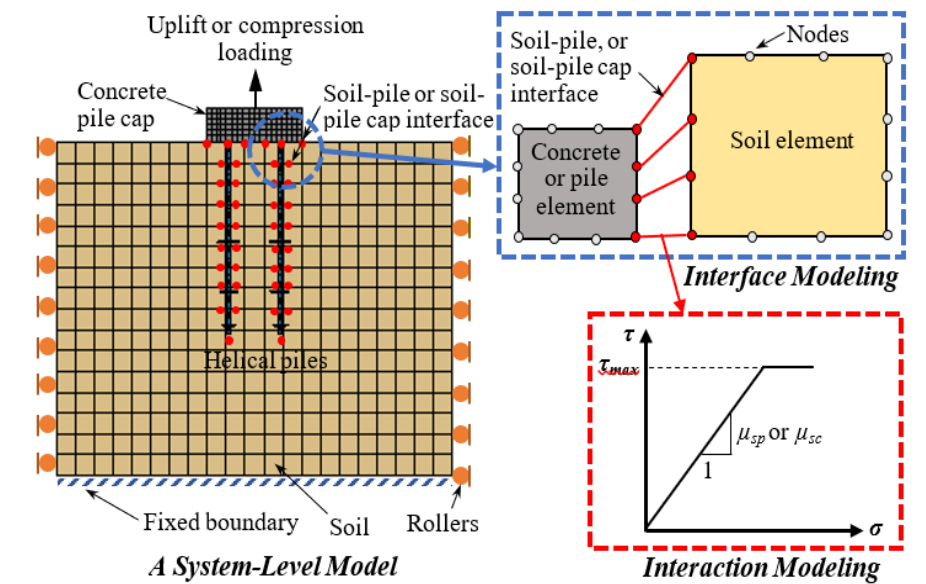
## Machine Learning

- Artificial neural networks (ANNs)
- Supervised & unsupervised models
- Applications to structural engineering
- Accounting for concrete cracking



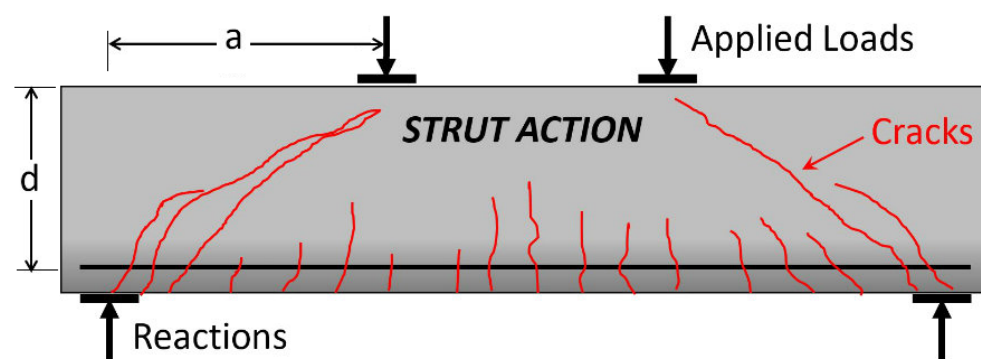
## Foundations and Anchorage

- Soil-foundation-structure interaction
- Pile-to-pile cap connections
- Post-installed concrete anchors
- Response to uplift loads
- Foundations for energy and telecommunication infrastructure
- Foundations for dynamic equipment
- Strengthening and upgrade



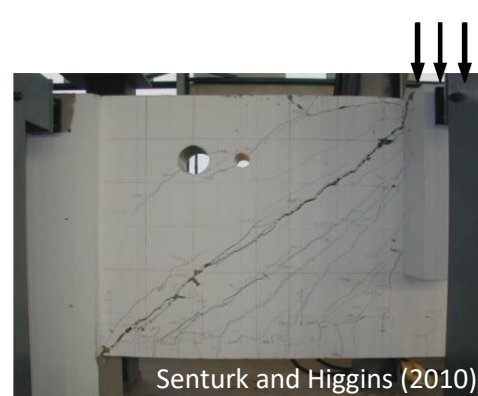
## Bridge Engineering & Rehabilitation

- Deep beams and disturbed regions
- Strength assessment and load rating
- Data collection and load testing
- Strengthening using advanced FRP composites and UHPC
- Cracking analysis, forensic engineering

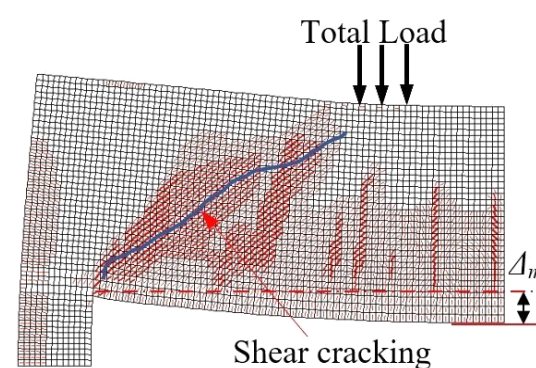


## Ultra-High-Performance Conc. (UHPC)

- Constitutive model development
  - Cracking and crack spacing formulation
  - Strain-hardening and -softening mixes
  - Members with no shear reinforcement
  - Aging/overloaded structure strengthening
- In collab. with Dr. Mihaylov at U. of Liege, Belgium.*



Experimental cracking condition



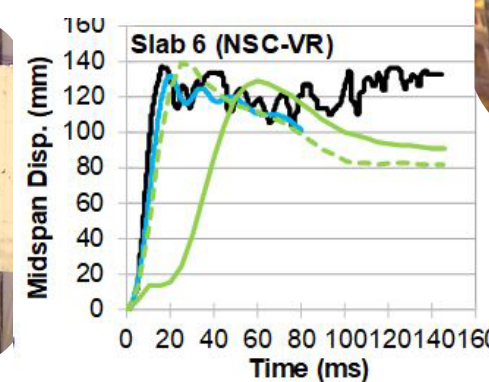
Cracking pattern from FE Model

# RESIST Group

*Computational Mechanics,  
Numerical Simulation &  
Experimental Validation*

## Response to Extreme Loads

- Impact and Blast loads
- High strain rate mechanics
- Progressive collapse
- Hurricane and tsunami impacts



VecTor5



FormWorks+



Janus



## Performance-Based Engineering for Natural Hazard Resilience

- Mixed-type and multi-scale modeling
- Shear-critical behavior of concrete
- Post-peak response and ductility
- Fragility functions
- Sustainability and life cycle aspects



## Computer Tools & Software

- VecTor5 & Janus
- STM-CAP
- ANN-Anchors; ANN-Customize
- Fragility Generator
- Equivalent Cone Method

*In collaboration with U. of Toronto, U. of Waterloo, and Carleton U., Canada.*