

Analysis, Visualization, and Design

In nonlinear response history analysis, each project is a new adventure.

To begin with, each building is different: different material type, different architecture, different configuration, different topography. On top of that, seismic demands vary from one site to another and from one Code cycle to another.

Armed with our past experience, we build a complicated model, attempting to make the right choices with regard to granularity and elemental inputs.

For existing buildings, the modeling process can take weeks and is often fraught with potential error as we read old drawings and try to translate what we find into ASCE 41 modeling parameters.

Modeling a new building is typically more straightforward in terms of modeling parameters since we have full knowledge of the design intent and since modern prescriptive design rules lead (we hope) to more predictable behavior, yet since the building does not yet exist, analyzing the proposed new building is embedded in the iterative design loop.

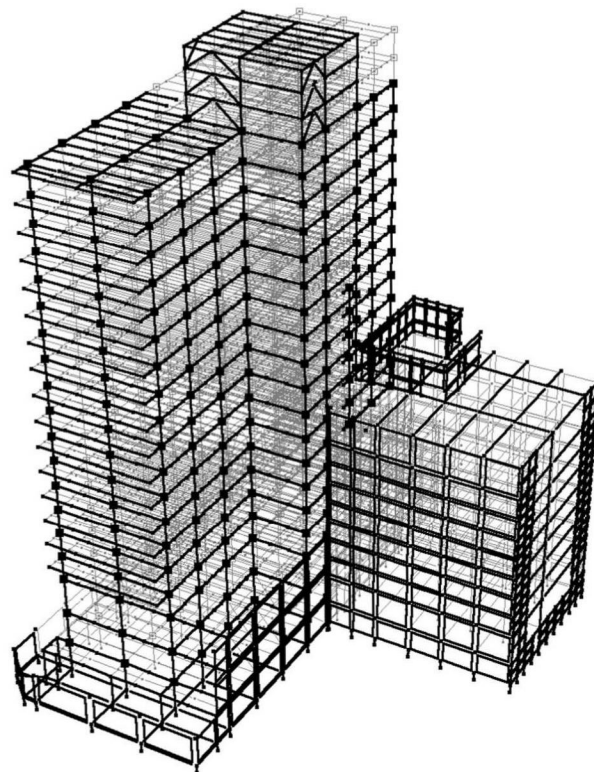
We subject the model to a suite of eleven ground motions, each with thousands of time-steps, and wait, often days, for the analysis to complete.

Within the analysis results may be the best opportunity for understanding the essential aspects of the building and the keys to finding the optimal design. Usually, they first embarrass us and show how poor some of our critical modeling assumptions were!

Throughout the process of modeling, analyzing, and synthesizing the results, there is a meta-problem: **how we see**. Although an airplane can go anywhere on earth, if it is engulfed in the mist of clouds or fog and does not have the instruments to see where it is going, it is not only useless but dangerous.

Analysis results can be like a cloud or fog, and we are most effective to the extent we develop the ability to see.

In this presentation, we discuss some of the challenges in visualizing information and the opportunities that good visualization affords. We push back against the notion that presenting data in a compelling manner is obsolete or that we engineers (number people) don't need to do it. We think about some good practices and some we might want to avoid.



Mike Korolyk, SE

Principal | Tipping Structural Engineers

MIKE KOROLYK JOINED TIPPING in 2006 and has been a Principal for eight years.

He earned both his BS in civil engineering and his MS in structural engineering at UC Berkeley.

His work at Tipping has focused on nonlinear response history analysis, and he has broad and deep experience modeling existing and historic structures as well as new structures. He has an exceptional ability to balance detailed understanding and intuition around dynamic nonlinear behavior with practical aspects of design and construction.

In support of Tipping's work, he has developed a number of powerful software tools. In 2017, he co-founded Tipping Applications, an independent firm devoted to selling software solutions primarily for Structural Engineers.

He has been directly involved in Tipping's most significant projects and has helped drive Tipping's innovative endeavors.

In his free time, he enjoys spending time with his wife and three children, playing music (drums, guitar, violin), exercising (hiking, biking), and woodworking, and he is a committed member and volunteer at his church.



RELEVANT PROJECTS

Berkeley Hotel | 2129 Shattuck *Berkeley, CA*
Rene Cazenave Apartments *San Francisco, CA*
Casa Adalante Family Housing | 1990 Folsom
San Francisco, CA
6465 San Pablo Family Housing *Oakland, CA*
Madison@14th Street Apartments *Oakland, CA*
1951 Shattuck Avenue *Berkeley, CA*
680 Folsom Street *San Francisco, CA*
520 S. El Camino Real Vertical Expansion *San Mateo, CA* (1)
San Francisco Public Utilities Commission HQ
San Francisco, CA
The David Brower Center and Oxford Plaza
Housing *Berkeley, CA*
UCB's International House Seismic
Improvements *Berkeley, CA* (2)
UCB Goldman Hearst Project *Berkeley, CA*
UCB David Blackwell Hall *Berkeley, CA* (3)
UCB Units 1, 2, and 3 Seismic Retrofits
Berkeley, CA
UCB Lewis Hall Seismic Evaluation and
Retrofit *Berkeley, CA*
UCB Hearst Greek Theatre Retrofit and
Renovation *Berkeley, CA* (4)
UCB Campbell Hall Astrophysics Building
Berkeley, CA
UCSF 2 North Point Conversion and
Improvements *San Francisco, CA*
Mission | Castro Cluster Seismic Retrofits
San Francisco, CA
1330 Broadway Seismic Retrofit *Oakland, CA*
Bishop Ranch AT&T South Wing Retrofit
San Ramon, CA
FEMA P-807: *Guidelines for the Seismic Retrofit of
Weak-Story Multiunit Wood-Frame Structures*

Licenses:

CA SE 5274
CA CE 64912



TIPPING Firm

Unlocking greater possibilities.

Tipping Structural Engineers is a service-forward structural engineering practice with an unconventional approach that blends creativity with technical mastery.

CLIENT SERVICE IS AT THE CORE OF WHAT WE DO.

We operate as thought partners to our clients, working side-by-side with them throughout the process. We believe that early and frequent collaboration is key to the success of a project.

WE WORK AT THE EDGE OF POSSIBLE TO SOLVE THE SEEMINGLY UNSOLVABLE.

We leverage our deep understanding of structural behavior, along with our suite of custom-built analytical tools to achieve what otherwise might seem out of reach. Our high level of technical mastery allows us to help realize our client's vision in unexpected ways.

RIGOROUS DESIGN THINKING LEADS TO IMPACTFUL DESIGN SOLUTIONS.

Our unconventional approach blends creative vision with sophisticated technical tools to push the boundaries of engineering for our clients. We think holistically about project goals, consider the task from all angles, and explore the unexpected.

WE BUILD VALUE INTO OUR PROCESS.

We continually integrate cost efficiencies throughout our design process. We collaborate closely with architects and project teams to craft elegant and cost-effective solutions that achieve project goals in innovative ways.



Founded in 1983 | State of California SBE | County of Alameda Certified SLEB | Total Staff: 41 | Lic. Structural Engineers: 11 | Lic. Civil Engineers: 13 | Structural designers: 9 | 56 Excellence in Structural Engineering Awards | 2 Living Building Challenge projects (one certified) | 23 LEED Platinum projects, 16 LEED Gold projects | 6 projects with LEED innovation points from Tipping innovations | 8 Net-Zero-Energy buildings | 9 AIA COTE Top Ten Green Projects | Signatory of SE 2050

Interested in an Internship?

Come join the Tipping community for an exciting internship that will give you the opportunity to apply your academic studies in real world situations while getting to learn more about our firm and people! Our internship program is shaped to intentionally expose our interns to designing different materials, scopes, and within different design phases.

<https://tinyurl.com/mvvy3s5d>

