

# TOI LAB.

## [Computational Solid Mechanics (Modeling and Simulation of Materials and Structures)]

Department of Mechanical and Biofunctional Systems

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Computational Solid Mechanics

Department of Systems Innovation

### Computational Solid Mechanics

#### Modeling and Simulation of Materials and Structures

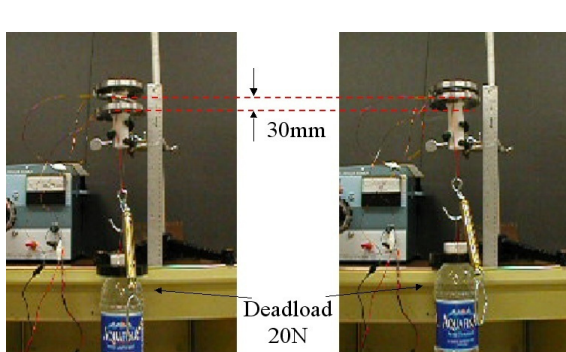
Toi Lab is developing numerical simulation methods such as finite element method and applying those to engineering design analysis and advanced technology to solve multi-field, multi-scale problems of materials and structures.

Material Engineering: Modeling of advanced functional materials (SMA, CP) and devices

Damage Mechanics: Mesomechanics evaluation of material damage and structural lifetime

Structural Engineering: Nonlinear, multi-field (magnetic, thermal, mechanical) analysis

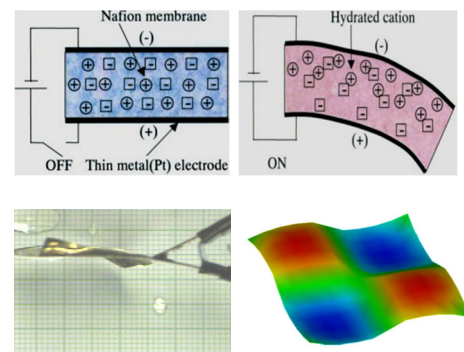
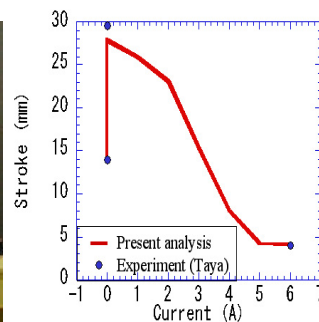
Industrial Applications: Applications to machinery, nuclear power plants and constructions



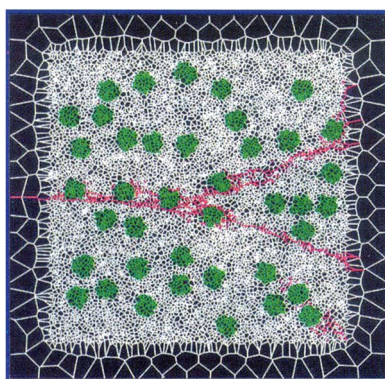
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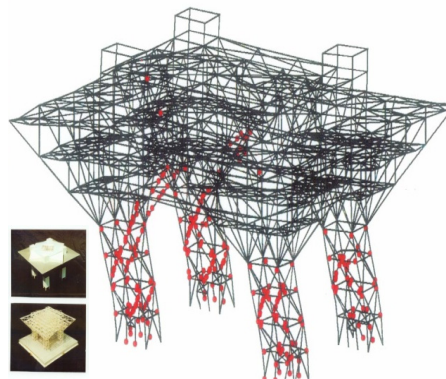
Magneto-superelastic response of FSMA actuator



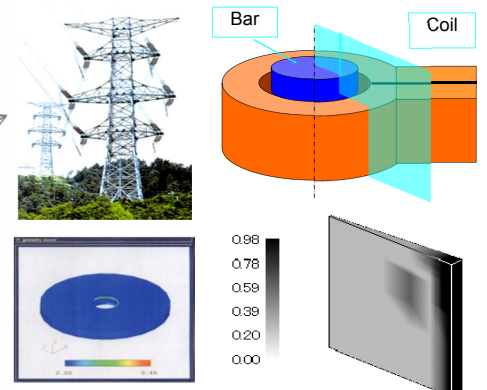
Electrochemical-mechanical response of CP actuator



Fracture of two-phase material (Alumina+Zirconia particles)



Plastic collapse of framed structures (Adaptively shifted integration method)



Embrittlement cracking in hot-dip galvanization  
Phase transformation in induction hardening (Electro-magnetic, thermal, mechanical)