



Computational Mechanics

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## Materials Engineering and Analysis

*Meeting the need for materials in energy applications*

Efficient use of energy resources requires materials with specific attributes such as strength, thermal characteristics and durability in the service environment of interest. The Materials Engineering and Analysis Group performs research on properties and behavior of engineering materials in energy related applications. Activities include development, analysis and performance prediction of cost-effective materials.

The Group's interests include, specialized cementitious materials, reinforced concrete durability, corrosion monitoring and control, non-destructive testing, structural and soil dynamics, soil- and fluid-structure interaction, computational mechanics, foundations for wind turbines and earthquake engineering.

Our research combines experimental characterization of material properties with computational analysis of the response of systems to operational and environmental loads. Based on this dual approach, we design and select innovative materials for particular applications. Field work to verify material performance is conducted in collaboration with end-users.

### Recent projects:

- Thermally conductive grouts for geothermal heat pumps
- Structural response analysis of geothermal wells
- Non-destructive testing of corrosion and erosion-induced damage in piping
- Dynamics of wind turbine-tower-foundation systems
- Fiber reinforced geothermal well cements
- Remediation of deformed well casing
- Corrosion of clad and thermal sprayed NiCrMo alloys
- Coatings and mix design for prevention of microbiological attack of concrete cooling towers
- Thermally insulative polymer concrete overlay for LNG facilities



Geothermal Energy



Field Testing



Wind Energy