Optimal Seismic Performance of Buildings with Advanced Engineering Materials

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There is are significant potential advantages in the use of advanced engineering materials to design and construct civil infrastructure, with a view to optimize tradeoffs between performance, cost and whole-life-cycle integrity. One such material is Engineered Cementitious Composites (ECC). In this seminar, the genesis of ECC is discussed, followed by presenting a comprehensive study to develop materials, constitutive models, hybrid testing framework, and an optimization environment to arrive at a methodology to design and assess buildings subjected to earthquake hazard.





Comparison between RC and ECC



Material constitution to achieve specific performance targets is discussed. A constitutive model is developed and verified at the material, member and system levels, and implemented in an advanced analysis code. Realistic small scale hybrid (analytical-physical) tests are designed and executed. System level models are designed and thoroughly analyzed. A new optimization framework is developed and applied to a large population of analytical response data, to satisfy a new Lifecycle Cost Analysis equation. The comprehensive study concludes that using ECC in seismic design avails of new opportunities for optimized cost-performance-economy. The presentation is preceded by an overview of the Department of Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign.



The seminar speaker with U of Napoli Colleagues during his last visit in 2002