



Fig. 5. Obtained and predicted postbuckling responses of a [45/–45] carbon/epoxy cylinders under axial compression.

## Professor Rigoberto Burgueño

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### Courses Taught:

- Introduction to Structural Analysis and Design (CE 305)
- Structural Mechanics (CE 400)
- Bridge Design (CE 800)
- Nonlinear Structural Mechanics (CE 801)
- Seismic Structural Design (CE 807)
- Advanced Composite Materials and Structures (CE 809)

### Recent Research:

Damage-compliant inelastic design parameters for performance-based-seismic-design of slender reinforced concrete bridge columns. National Science Foundation.

Effects of restrained concrete shrinkage on early-age cracking of decks in jointless bridges. Michigan Department of Transportation.

Deterioration models for concrete bridge decks through soft-computing methods. Michigan Department of Transportation.

Nano-reinforced cellular foams for tailored stress-wave mitigation of impact and blast effects. National Science Foundation.

Effects of debonded strands on the end-cracking of pre-tensioned concrete beams. Michigan Department of Transportation, Precast Concrete Institute.

Inelastic web-crushing performance limits of high-strength-concrete structural walls. National Science Foundation (NEES).

Diagnosis models for identification and relief of structural distress in bridge abutments through artificial neural networks. Michigan Department of Transportation.

Tailorable materials and structures through multi-scale computation and evolutionary optimization. National Science Foundation, Michigan State University.

Nano-reinforced bio-based composites for load bearing structures. National Science Foundation.

### **Research Interests:**

Primary background and research interests are related to the development, performance assessment, and implementation of innovative materials to civil infrastructure. In particular, recent research emphasis is on: (i) development of tailored structural materials, components and systems, (ii) solid and structural mechanics in multi-scale problems, (iii) computational design optimization of materials and structures, (iv) large-scale testing, (v) low-cost and innovative manufacturing of tailored materials and structures; (vi) soft-computing methods for structural design and assessment; (vii) innovative experimental and measurement techniques; (viii) earthquake engineering; and (ix) bridge design.

### **Education:**

University of California, San Diego: Ph.D., Structural Engineering

### **Awards and Honors:**

Research: Outstanding Paper by Young Author Award (IABSE 2002 Symposium); 1996 CERF Charles Pankow Award for Innovation (co-recipient).

Teaching: 2011 Withrow Award for Teaching Excellence (MSU-CEE); 2006 Teacher-Scholar Award (MSU); 2005 Withrow Award for Teaching Excellence (MSU-CEE); 2004-2005 Lilly Teaching Fellow (MSU); 2003 William A. Bradley Award for Outstanding CEE Faculty (MSU-CEE).

### **Patents:**

U.S. Patent No. 7,232,605, "Hybrid Natural Fiber-Composites with Cellular Skeletal Structures," R. Burgueño, A.K. Mohanty, and M.J. Quagliata, Michigan State University 4.1-654 ID03-66, June 21, 2007.

### **Selected Publications:**

Burgueño, R., Liu, X. and Hines, E., "Web Crushing Capacity of high-strength concrete structural walls," ACI Structural Journal. In review.

Haq, M., Burgueño, R., Mohanty, A.K., and Misra, M. (2011). "Bio-based polymer nanocomposites from UPE/EML blends and nanoclay: Development, experimental characterization and limits to synergistic performance," *Composites - Part A: Applied Science and Manufacturing*, Vol. 42, pp. 41-49.

Li, Z. and Burgueño, R. (2010) "Using Soft Computing to Analyze Inspection Results for Bridge Evaluation and Management," *Journal of Bridge Engineering*, Vol. 15, No. 4, pp. 430-438.

Haq, M., Burgueño, R., Mohanty, A.K., and Misra, M. (2009) "Bio-based Unsaturated Polyester/Layered Silicate Nanocomposites: Characterization and Thermo-Physical Properties," *Composites - Part A: Applied Science and Manufacturing*, Vol. 40, No. 4, pp. 540-457.

Haq, M., Burgueño, R., Mohanty, A.K., and Misra, M. (2009) "Bio-based Unsaturated Polyester/Layered Silicate Nanocomposites: Characterization and Thermo-Physical Properties," *Composites - Part A: Applied Science and Manufacturing*, Accepted, in press.

Haq, M., Burgueño, R., Mohanty, A.K., and Misra, M. (2008) "Hybrid Bio-based Composites from Blends of Unsaturated Polyester and Soy Bean Oil Reinforced with Nanoclay and Natural Fibers," *Composites Science and Technology*, Vol. 68, No. 15-16, pp. 3344-3351.

Burgueño, R. and Haq, M. (2007). Effect of SCC Mix Proportioning on Transfer and Development Length of Prestressing Strand. *American Concrete Institute*, SP-247:105-116.

Miyagawa, H., Mohanty, A.K., Burgueño, R., Drzal, L.T., Misra, M. (2007). Novel Biobased Resins from the Blends of Functionalized Soybean Oil and Unsaturated Polyester Resin. *Journal of Polymer Science Part B: Polymer Physics*, 45:698-704.

Miyagawa, H., Mohanty, A., Burgueño, R., Drzal, L.T., and Misra, M. (2006). Characterization and Thermophysical Properties of Unsaturated Polyester-Layered Silicate Nanocomposites. *Journal of Nanoscience and Nanotechnology*, 6(2): 464-471.

Burgueño, R., and Bhide, K. (2006). Shear Response of Concrete Filled FRP Composite Cylindrical Shells. *Journal of Structural Engineering*. Vol. 132, No. 6, pp. 949-960.

Wu, J., and Burgueño, R. (2006) An Integrated Approach to Shape and Stacking Sequence Optimization of Free-From FRP Shells. *Computer Methods in Applied Mechanics and Engineering*. Vol. 195, No. 33-36, pp. 4106-4123.

Burgueño, R., Quagliata, M.J., Mohanty, A.K., Mehta, G., Drzal, L.T., and Misra, M., (2005). Hierarchical Cellular Designs for Load-Bearing Biocomposite Beams and Panels. *Materials Science & Engineering A*. 390: 178-187.

Burgueño, R., Quagliata, M.J., Mohanty, A.K., Mehta, G., Drzal, L.T., and Misra, M. (2004). Load-Bearing Natural Fiber Composite Cellular Beams and Panels. *Composites Part A*. 35 (6): 645-656.

Burgueño, R., Davol, A., Zhao, L., Seible, F., and Karbhari, V. M. (2004). Flexural Behavior of a Hybrid FRP/Concrete Beam/Slab Bridge Component. *ACI Structures Journal*. 101(2): 228-236.

Burgueño, R., Karbhari, V. M., Seible, F. and Kolozs, R. T. (2001). Experimental Dynamic Characterization of an FRP Composite Bridge Superstructure Assembly. *Composite Structures*, 54(4): 427-444.

Davol, A., Burgueño R., and Seible, F. (2001). Flexural Behavior of Circular Concrete Filled FRP Shells. *Journal of Structural Engineering*, 127(7): 810-817.

Karbhari, V. M., Seible, F., Burgueño, R., Davol, R., Wernli, M., and Zhao, L. (2000). Structural Characterization of Fiber-Reinforced Composite Short- and Medium-Span Bridge Systems. *Applied Composite Materials*. 7(2/3): 151-182.

Seible, F., Karbhari, V. M., and Burgueño, R. (1999). Kings Stormwater Channel and I-5/Gilman Bridges. *Structural Engineering International*, 9(4): 250-253