

**Formulation and Validation of a Nonlinear Shell Element for the Analysis of  
Reinforced Concrete and Masonry Structures**

David Burchnall

Thesis submitted to the faculty of the  
Virginia Polytechnic Institute and State University  
in partial fulfillment of the requirements for the degree of

Master of Science

in

Civil Engineering

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May 6, 2014

Blacksburg, VA

Keywords: shell element, geometric nonlinearity, reinforced concrete and masonry

**Draft 09/01/2009**

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## Virginia Tech ETD Fair Use Analysis Results

*This is not a replacement for professional legal advice but an effort to assist you in making a sound decision.*

Name: David Burchnell

Description of item under review for fair use: Batoz, J.-L., and Tahar, B. 1982, "Evaluation of a New Quadrilateral Thin Plate Bending Element." International Journal for Numerical Methods in Engineering 18 (11): 1655–77.

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### **Based on the information you provided:**

#### **Factor 1**

Your consideration of the purpose and character of your use of the copyright work weighs: *in favor of fair use*

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Your consideration of the nature of the copyrighted work you used weighs: *in favor of fair use*

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Your consideration of the effect or potential effect on the market after your use of the copyrighted work weighs: *in favor of fair use*

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Name: David Burchnall

Description of item under review for fair use: Cervera, M., Hinton, E., and Hassan, O. (1987), "Nonlinear Analysis of Reinforced Concrete Plate and Shell Structures Using 20-noded Isoparametric Brick Elements." Computers & Structures 25 (6): 845-869.

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### **Based on the information you provided:**

#### **Factor 1**

Your consideration of the purpose and character of your use of the copyright work weighs: *in favor of fair use*

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Name: David Burchnell

Description of item under review for fair use: Hu, H.-T., and Schnobrich, W.C. (1991), "Nonlinear Finite Element Analysis of Reinforced Concrete Plates and Shells Under Monotonic Loading." Computers & Structures 38 (5): 637-651.

Report generated on: 04-19-2014 at : 18:50:24

### **Based on the information you provided:**

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Your consideration of the purpose and character of your use of the copyright work weighs: *in favor of fair use*

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Your consideration of the nature of the copyrighted work you used weighs: *in favor of fair use*

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Name: David Burchnell

Description of item under review for fair use: Hughes, T. 2000. The Finite Element Method: Linear Static and Dynamic Finite Element Analysis. Dover Publications, Inc.

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### **Based on the information you provided:**

#### **Factor 1**

Your consideration of the purpose and character of your use of the copyright work weighs: *in favor of fair use*

#### **Factor 2**

Your consideration of the nature of the copyrighted work you used weighs: *in favor of fair use*

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Name: David Burchnell

Description of item under review for fair use: Kim, T.-H., Lee, K.-M., and Shin, H.M. (2002), "Nonlinear Analysis of Reinforced Concrete Shells Using Layered Elements with Drilling Degree of Freedom." ACI Structural Journal 99 (4).

Report generated on: 04-19-2014 at : 19:03:16

### **Based on the information you provided:**

#### **Factor 1**

Your consideration of the purpose and character of your use of the copyright work weighs: *in favor of fair use*

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Name: David Burchnell

Description of item under review for fair use: Koutromanos, I. (2011), "Numerical Analysis of Masonry-Infilled Reinforced Concrete Frames Subjected to Seismic Loads and Experimental Evaluation of Retrofit Techniques." Ph.D. Dissertation, University of California, San Diego, La Jolla, CA, 355pp.

Report generated on: 04-19-2014 at : 19:05:09

### **Based on the information you provided:**

#### **Factor 1**

Your consideration of the purpose and character of your use of the copyright work weighs: *in favor of fair use*

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Description of item under review for fair use: Koutromanos, I., and B. Shing. 2010. "Trial Application: Reinforced Masonry Shear Wall Structures." In Evaluation of the FEMA P-695 Methodology for Quantification of Building Seismic Performance Factors. National Institute of Standards and Technology, USA.

Report generated on: 04-19-2014 at : 18:33:27

### **Based on the information you provided:**

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Your consideration of the purpose and character of your use of the copyright work weighs: *in favor of fair use*

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Name: David Burchnell

Description of item under review for fair use: Mazars, J., Kotronis, P., and Davenne, L. (2002), "A New Modelling Strategy for the Behaviour of Shear Walls under Dynamic Loading." Earthquake Engineering & Structural Dynamics 31 (4): 937-54.

Report generated on: 04-19-2014 at : 18:39:07

### **Based on the information you provided:**

#### **Factor 1**

Your consideration of the purpose and character of your use of the copyright work weighs: *in favor of fair use*

#### **Factor 2**

Your consideration of the nature of the copyrighted work you used weighs: *in favor of fair use*

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Name: David Burchnell

Description of item under review for fair use: Massicotte, B., MacGregor, J., and Elwi, A. (1990), "Behavior of Concrete Panels Subjected to Axial and Lateral Loads." Journal of Structural Engineering 116 (9): 2324–2343.

Report generated on: 04-19-2014 at : 18:57:25

### **Based on the information you provided:**

#### **Factor 1**

Your consideration of the purpose and character of your use of the copyright work weighs: *in favor of fair use*

#### **Factor 2**

Your consideration of the nature of the copyrighted work you used weighs: *in favor of fair use*

#### **Factor 3**

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Name: David Burchnall

Description of item under review for fair use: Mavros, M. 2013. Personal Communication.

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Your consideration of the purpose and character of your use of the copyright work weighs: *in favor of fair use*

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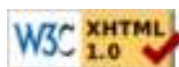
#### **Factor 3**

Your consideration of the amount and substantiality of your use of the copyrighted work weighs: *in favor of fair use*

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Name: David Burchnell

Description of item under review for fair use: Panagiotou, M., and Restrepo, J. (2010), "Displacement-Based Method of Analysis for Regular Reinforced-Concrete Wall Buildings: Application to a Full-Scale 7-Story Building Slice Tested at UC-San Diego." Journal of Structural Engineering 137 (6): 677-90.

Report generated on: 04-19-2014 at : 19:08:31

### **Based on the information you provided:**

#### **Factor 1**

Your consideration of the purpose and character of your use of the copyright work weighs: *in favor of fair use*

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Description of item under review for fair use: Panagiotou, M., Restrepo, J., and Conte, J. (2007), "Shake Table Test of a 7-story Full Scale Reinforced Concrete Structural Wall Building Slice Phase I: Rectangular Wall Section" Report No. SSRP-07-07, San Diego, CA.

Report generated on: 04-21-2014 at : 15:29:40

### **Based on the information you provided:**

#### **Factor 1**

Your consideration of the purpose and character of your use of the copyright work weighs: *in favor of fair use*

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Your consideration of the nature of the copyrighted work you used weighs: *in favor of fair use*

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Report generated on: 04-19-2014 at : 19:12:11

### **Based on the information you provided:**

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Your consideration of the purpose and character of your use of the copyright work weighs: *in favor of fair use*

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Your consideration of the nature of the copyrighted work you used weighs: *in favor of fair use*

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Your consideration of the amount and substantiality of your use of the copyrighted work weighs: *in favor of fair use*

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Name: David Burchnell

Description of item under review for fair use: Panagiotou, M., Restrepo, J., Schoettler, M., and Kim, G. (2012), "Nonlinear Cyclic Truss Model for Reinforced Concrete Walls." ACI Structural Journal: 205–214.

Report generated on: 04-19-2014 at : 18:42:39

### **Based on the information you provided:**

#### **Factor 1**

Your consideration of the purpose and character of your use of the copyright work weighs: *in favor of fair use*

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Your consideration of the nature of the copyrighted work you used weighs: *in favor of fair use*

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Description of item under review for fair use: Polak, M., and Vecchio, F. (1993), "Nonlinear Analysis of Reinforced-Concrete Shells." Journal of Structural Engineering 119 (12): 3439–3462.

Report generated on: 04-19-2014 at : 18:53:31

### **Based on the information you provided:**

#### **Factor 1**

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Report generated on: 04-19-2014 at : 17:50:50

### **Based on the information you provided:**

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Description of item under review for fair use: Taylor, A. W., Kuo, C., Wellenius, K., Chung, D. M. (1997), "A Summary of Cyclic Lateral Load Tests on Rectangular Reinforced Concrete Columns," Report NISTIR 5984, National Institute for Standards and Technology, Gaithersburg, Maryland, 101 pp.

Report generated on: 04-19-2014 at : 19:07:06

### **Based on the information you provided:**

#### **Factor 1**

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Description of item under review for fair use: Vallenias, J., Bertero, V., and Popov, E. (1979), "Hysteric Behavior of Reinforced Concrete Structural Walls." NASA STI/Recon Technical Report N 80: 27533.

Report generated on: 04-19-2014 at : 18:35:46

### **Based on the information you provided:**

#### **Factor 1**

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