

# UPUL ATTANAYAKE

Department of Civil and Construction Engineering  
Parkview Campus, G242  
Western Michigan University  
1903 W. Michigan Ave  
Kalamazoo, MI 49008 - 5316

Phone: 269-276-3217 (work)  
313-492-8982 (cell)  
Fax: 269-276-3211  
E-mail: [upul.attanayake@wmich.edu](mailto:upul.attanayake@wmich.edu)

## EDUCATION

- Ph.D**                      **Civil/Structural Engineering**                      **2006**  
Wayne State University, Detroit, Michigan  
Dissertation: *Macromechanical modeling of precast orthotropic bridge superstructure systems*  
Advisor: Professor Haluk M. Aktan
- M.Eng**                      **Structural Engineering**                      **2001**  
Asian Institute of Technology, Bangkok, Thailand  
Thesis: *Seismic evaluation of typical low-rise concrete commercial buildings by the capacity spectrum method*  
Advisor: Associate Professor Pennung Warnitchai
- B.Sc. Eng. (Hons)**      **Civil Engineering**                      **1998**  
University of Peradeniya, Peradeniya, Sri Lanka  
Research Project: *Analysis of deep beams with and without openings*  
Advisor: Professor M. P. Ranaweera
- Miscellaneous**        **Fire Safety and Fire Engineering Science** – Graduate level  
The Institute of Fire Engineers, Gloucestershire, GL56 0RH, United Kingdom

**PROFESSIONAL LICENSING**      Engineer-in-Training (EIT)

## HONORS, AWARDS, AND SCHOLARSHIPS

- ExCEED (Excellence in Civil Engineering Education) 2008 Teaching Fellow.
- Great Lakes Cement Promotion Association (GLCPA) Travel Grant:
  - Bridge Professors' Seminar: Design of Concrete Bridges by the AASHTO LRFD Specifications. August 2007.
  - Building Professors' Seminar: Engineering and Economics of Reinforced Concrete Buildings. July 2007.
  - ACBM/PCA Undergraduate Faculty Enhancement Program – Workshop. June 2007.
- Outstanding Teaching Assistant Service Award, Wayne State University, Detroit, MI 48202. April 2006.
- Dissertation Fellowship, Wayne State University, Detroit, MI 48202. June – August 2005.
- Norway Government Scholarship, Asian Institute of Technology, Bangkok, Thailand. September 1999 – April 2001.
- Sri Lanka Army Ex-Servicemen's Association Scholarship, Colombo, Sri Lanka. August 1996 – August 1998.
- Sri Lankan Government Scholarship, University of Peradeniya, Sri Lanka. February 1994 – August 1998.

## RESEARCH PROPOSALS

1. **Dr. Attanayake (Co-PI)** submitted a joint proposal with EYZtek, Dayton OH, and American Industrial Metrology (AIM), Hamilton OH, on "*Light Rolling Weight Deflectometer (LRWD)*" for the National Institute of Standards and Technology (NIST): Technology Innovation Program (TIP). Total budget **\$13 millions** and Western Michigan University share is **\$3.4 millions/ 5 years**. (09/04/2008).
2. **Dr. Attanayake (PI)** submitted a letter of interest for NCHRP synthesis topic 39-10: *Adjacent Pre-cast Box Girder Bridges*. (08/13/2007).
3. **Dr. Attanayake (PI)** submitted a pre-proposal to FHWA Exploratory Advance Research Program (BAA DTFH61--07-R-0117) on "*Feedback Controlled Product Development and Advanced Sensor Technology for Concrete: Opti-Thermal In-Situ Concrete for a Century of Service*." (03/30/2007).

## PROFESSIONAL EXPERIENCE

### Courses Taught

COURSE TITLE	COURSE LEVEL	INSTITUTION	SEMESTER/ YEAR
CE4400: Structural Analysis	Undergraduate	Wayne State Univ.	Fall 2005
CCE3380: Construction Materials and Methods	Undergraduate	Western Michigan Univ.	Spring 2007
CCE3860: Structural Analysis	Undergraduate	Western Michigan Univ.	Spring 2007
CCE3360: Soil Mechanics	Undergraduate	Western Michigan Univ.	Fall 2007/ 2008
CCE6040: Advanced Structural Analysis	Graduate	Western Michigan Univ.	Fall 2007/ 2008
CCE6960: Finite Element Applications	Graduate	Western Michigan Univ.	Summer II 2008
CCE6850: Advanced Design Project/ Independent Study	Graduate	Western Michigan Univ.	Fall 2008

### Course Assistant

COURSE TITLE	COURSE LEVEL	INSTITUTION	SEMESTER - YEAR
CE4450: Civil Engineering Materials	Undergraduate	Wayne State Univ.	Fall 2004
CE4420: Reinforced Concrete Design	Undergraduate	Wayne State Univ.	Fall 2006
CE7410: Assessment and Upgrade of Structures	Graduate	Wayne State Univ.	Fall 2004
CE7370: Advanced Finite Element Analysis	Graduate	Wayne State Univ.	Winter 2005/ Fall 2006
CE6370: Advanced Concrete Design	Graduate	Wayne State Univ.	Winter 2005
CE7450: NDT for Structural Evaluation	Graduate	Wayne State Univ.	Fall 2005

### Assistant Professor (*non-tenure track*)

**August 2008 – Present**

#### Civil and Construction Engineering Department, Western Michigan University

Duties include supervising and directing a group of undergraduate/graduate students working on research projects, preparing research proposals for acquiring research grants from various funding agencies, and teaching undergraduate/ graduate courses. Dr. Attanayake's other duties include serving on departmental committees and performing services that are necessary to implement the educational programs and academic objectives of the department.

Dr. Attanayake has been developing an independent research agenda. He is the project associate in the following research project.

Project: *Condition assessment and methods of abatement of prestressed concrete box-beam deterioration - Phase II*  
*Funded by Michigan Department of Transportation*

### Research Associate

**January 2007 – July 2008**

#### Civil and Construction Engineering Department, Western Michigan University

*Supervisor: Prof. Haluk Aktan, Ph.D, P.E.*

Duties included supervising and directing a group of undergraduate/graduate students working on funded research projects, preparing research proposals for acquiring research grants from various funding agencies, and teaching undergraduate/ graduate courses. Dr. Attanayake served on departmental committees implementing the educational programs and academic objectives of the department.

Dr. Attanayake provided **HyperMesh** and **ABAQUS** expertise to the Center for Advanced Vehicle Design and Simulation (**CAViDS**) at Western Michigan University for generating finite element models and assessing duty-cycle performance of semi-trailers.

Dr. Attanayake conducted a series of workshops for bridge engineers. The primary objective was to educate bridge engineers on basic finite element concepts and provide hands-on experience in modeling and analysis of complicated bridge systems using SAP2000.

Dr. Attanayake was the project associate in following research project.

Project: *Combining Link-Slab, Deck Sliding over Back-Wall and Revising Bearings*  
*Funded by Michigan Department of Transportation*

Studied the performance of current jointless bridges with link slabs by analyzing field inspection data. Performed finite element analysis of link slab bridge system with standard and semi-integral abutment designs following

AASHTO and MDOT guidelines. Developed analysis guidelines and design details for link slab and continuous deck over the abutments to mitigate identified performance issues in the current design.

**Post Doctoral Research Fellow**

**September 2006 – December 2006**

**Civil and Environmental Engineering Department, Wayne State University**

*Supervisor: Prof. Haluk Aktan, Ph.D, P.E.*

Duties included supervising and directing a group of graduate research assistants and undergraduate student assistants to conduct research at the Center for Structural Durability at Wayne State University. Dr. Attanayake was responsible for planning and leading a group of students for field inspection of link slab bridges for the MDOT funded project titled *Combining Link-Slab, Deck Sliding over Back-Wall and Revising Bearings*.

Dr. Attanayake was responsible for planning and designing of load configuration and instrumentation layout for load testing of a decommissioned precast prestressed concrete box-beam. The load testing was performed as part of the MDOT funded project titled *Condition assessment and methods of abatement of prestressed concrete box-beam deterioration - Phase II*.

As the course assistant Dr. Attanayake was responsible for conducting training courses for graduate students on finite element analysis using ABAQUS and pre- and post- processing of analysis models using HyperMesh for the Advanced Finite Element Analysis course. For the reinforced concrete design course, he prepared and graded student homework in addition to preparing examinations under the guidance of the course instructor

**Graduate Teaching Assistant**

**September 2004 – August 2006**

**Civil and Environmental Engineering Department, Wayne State University**

*Courses Taught:*

- CE4400: Structural Analysis – *Designated instructor* for the course; conducted a training course on RISA3D

*Course Assistant:*

- CE4450: Civil Engineering Materials – Laboratory supervision and teaching material testing methods
- CE6370: Advanced Concrete Design – Prepared and graded student homework; prepared exams under the guidance of course instructor
- CE7450: Non Destructive Testing for Structural Evaluation – Supervised students performing several nondestructive testing techniques such as ultrasonic pulse velocity, impact echo, infrared thermography, resistivity and electrical testing methods, corrosion mapping, dynamic property measurements, load testing, and use of thickness gauge and rebar locator
- CE7410: Assessment and Upgrade of Structures – Conducted training courses for graduate students on *static pushover* and *blast load analysis* using SAP2000 nonlinear
- CE7370: Advanced Finite Element Analysis – Conducted training courses for graduate students on finite element analysis using *ABAQUS* and pre- and post- processing of analysis models using *HyperMesh*.

**Graduate Research Assistant,  
Center for Structural Durability, Wayne State University**

**September 2001 – August 2004**

Project: *Condition assessment and methods of abatement of prestressed concrete box-beam deterioration - Phase I*  
*Funded by Michigan Department of Transportation*

Administered inspection of 15 bridges. Identified the causes of distress and their progression. Investigated the residual capacity of distressed box-beams analytically and by using finite element analysis methods (HyperMesh and ABAQUS). Proposed box-beam design changes.

Project: *Causes and cures for cracking of concrete barriers*  
*Funded by Michigan Department of Transportation*

Identified causes and progression of distress by utilizing the data collected from inspection of New Jersey barriers of 20 bridges, monitoring of five barrier replacement projects, testing of core samples and standard 6-in.x12-in cylinder specimens, and survey of state bridge engineers. Verified distress progression using finite element analysis method (HyperMesh and ABAQUS). Recommended modifications to construction and material specifications and maintenance procedures for improved bridge barrier durability.

Project: *Investigate causes and develop methods to minimize early-age deck cracking on Michigan bridge decks*  
*Funded by Michigan Department of Transportation*

Data collected from survey of state bridge engineers, inspection of 20 bridges decks, monitoring of five bridge deck replacement projects, and testing of standard 6-in.x12-in and 4-in.x6-in cylinder specimens. Identified the causes of early-age deck cracking and verified by analytical methods. Recommended modifications to construction and material specifications and maintenance procedures to minimize early-age bridge deck cracking.

Project: *Criteria and benefits of penetrating sealants for bridge decks*  
*Funded by Michigan Department of Transportation*

Studied the feasibility of using penetrating type sealants for concrete bridge decks. Identified products that can be used as penetrating sealants, their chemistry, and factors affecting sealant penetration (concrete properties, sealant properties, and ambient environmental conditions). Recommended sealant selection, application, and evaluation procedures that can be used to reduce moisture and chloride ion ingress for improving bridge deck durability.

**Structural Engineer**

**May 2001 – August 2001**

**Ceylon Electricity Board, Colombo, Sri Lanka**

Duties included analysis and design of a new office building (BS 8110).

**Research Associate**

**September 1999 – April 2001**

**School of Civil Engineering, Asian Institute of Technology, Thailand**

Project: *Seismic evaluation of reinforced concrete commercial buildings in Bangkok, Thailand*

*Funded by Meteorological Department of Thailand, Royal Thai Government*

Member of the research team that evaluated the seismic capacity of reinforced concrete commercial buildings. Generated 3D FE structural models and assigned plastic hinges following ATC-40 and FEMA-273 guidelines. Estimated lateral load capacity using SAP 2000 nonlinear version. Recommended retrofitting to the buildings with inadequate lateral load capacity.

**Teaching Assistant**

**September 1998 – July 1999**

**Department of Civil Engineering, University of Peradeniya, Sri Lanka**

Laboratory supervision and teaching of standard (ASTM) test methods for evaluating properties of fresh and hardened concrete and steel.

Laboratory supervision of undergraduate students performing model tests on beams, columns, and frames.

**Engineering Apprentice, A.K. Diyabalanage Associates (Pte) Ltd., Sri Lanka      October 1991 – December 1993**

Assisted in the preparation of AutoCAD drawings and testing of construction materials.

**PROFESSIONAL ORGANIZATIONAL MEMBERSHIPS**

- Transportation Research Board - AFN30 Durability of Concrete (member: 2007- present)
- Transportation Research Board - AFF30 Concrete Bridges (friend of the committee)
- Transportation Research Board - AFF40 Dynamics and Field Testing of Bridges (friend of the committee)
- American Society of Civil Engineers (ASCE) – Associate Member
- Structural Engineers Association of Michigan (SEAMi) – Associate Member

**HONORARY SOCIETY MEMBERSHIP**

- Chi Epsilon - Civil Engineering Honor Society

**COMPUTER SKILLS**

- AutoCAD
- ABAQUS, HyperWorks, SAP2000, RISA3D
- MATHEMATICA, MAPLE, MATLAB, MATHCAD

**PROFESSIONAL DEVELOPMENT ACTIVITIES**

- ExCEED Teaching Workshop, West Point Military Academy, NY, July 23-28, 2008
- Concrete Bridge Conference, Hyatt Regency, St. Louis, Missouri, May 4-7, 2008
- 87<sup>th</sup> Transportation Research Board (TRB) Annual Meeting, January 13-17, 2008
- Portland Cement Association Bridge Professors' Seminar: Design of Concrete Bridges by the AASHTO LRFD Specifications: August 2 - 3, 2007
- Portland Cement Association Building Professors' Seminar: Engineering and Economics of Reinforced Concrete Buildings: July 30- August 1, 2007
- Portland Cement Association ACBM Undergraduate Faculty Enhancement Workshop - 2007 Professor's Seminar on Concrete, Skokie, Illinois, June 18-20, 2007
- 86<sup>th</sup> Transportation Research Board (TRB) Annual Meeting, January 21-25, 2007

- 85<sup>th</sup> Transportation Research Board (TRB) Annual Meeting, January 22-26, 2006
- 84<sup>th</sup> Transportation Research Board (TRB) Annual Meeting, January 09-13, 2005
- 83<sup>rd</sup> Transportation Research Board (TRB) Annual Meeting, January 11-15, 2004
- ACI Convention Fall 2004, San Francisco, California, October 24-28, 2004
- Michigan Bridge Conference, Mt. Pleasant, Michigan, May 14, 2003
- 82<sup>nd</sup> Transportation Research Board (TRB) Annual Meeting, January 12-16, 2003

#### UNIVERSITY/ COLLEGE/ DEPARTMENT SERVICES

1. Coordinator and presenter, Department of Civil & Construction Engineering, Family Weekend – Recruiting event, October 06, 2007.
2. Presenter, Department of Civil & Construction Engineering, Fall Open House – Recruiting event, Oct 19, Nov. 2 and Nov. 30, 2007.

#### CONFERENCE/WORKSHOP ACTIVITIES

1. Organizer and Instructor: *Finite Element Basics and Refined Bridge Structural Analysis - Workshop*, Department of Civil & Construction Engineering, Western Michigan University, June 24/25 and 26/27, 2008.

#### PUBLICATIONS AND PRESENTATIONS

##### *Thesis and Dissertation*

**Attanayake, U.** “Macromechanical modeling of precast orthotropic bridge superstructure systems,” *Ph.D Dissertation*, Wayne State University, Detroit, Michigan, August 2006.

**Attanayake, A. M. U. B.** “Seismic Evaluation of a Typical Low-Rise Reinforced Concrete Commercial Building in Bangkok by the Capacity Spectrum Method,” *Master Thesis, ST-01-5*, Asian Institute of Technology, Bangkok, Thailand, April 2001.

##### *Journals and Refereed Conference Proceedings*

**Attanayake, U.** Akbay, Z., and Aktan, H. “Macromechanical modeling for load analysis of side-by-side box-beam bridge superstructure,” *Journal of Bridge Engineering*, (submitted for review).

El-Safty, A. and **Attanayake, U.** “The effectiveness of CFRP laminates in strengthening reinforced concrete girders,” 88<sup>th</sup> *TRB Annual Meeting* (submitted for review).

Ulku, E., **Attanayake, U.**, and Aktan, H. M. "Jointless Bridge Deck with Link Slabs – Design for Durability," 88<sup>th</sup> *TRB Annual Meeting, No. 09-3577* (submitted for review).

**Attanayake, U.** and Aktan, H. M. "Side-by-side Box-beam Bridge Superstructure – Rational Transverse Posttension Design," 88<sup>th</sup> *TRB Annual Meeting, No. 09-3420* (submitted for review).

Ulku, E., **Attanayake, U.**, and Aktan, H. M. "Retrofit Design Details for Deck Joint Elimination over Abutments," 88<sup>th</sup> *TRB Annual Meeting, No. 09-2716* (submitted for review).

El-Safty, A., Coby, R., **Attanayake, U.**, and Yousri, K. “Shear Strengthening of Reinforced Concrete Beams using CFRP Laminates,” 2008 PCI-FHWA National Bridge Conference, Rosen Shingle Creek, Orlando, Florida, October 5-8, 2008.

**Attanayake, U. B.**, Ulku, A. E., and Aktan, H. M. “Structural system durability through jointless bridge decks”, *Fourth International Conference on Bridge Maintenance, Safety and Management, IABMAS 2008*, Seoul, Korea, July 13 – 17, 2008.

**Attanayake, U.** and Aktan, H. “Issues with Reflective Deck Cracks in Side-by-Side Box-Beam Bridges,” *The 4<sup>th</sup> Concrete Bridge Conference*, Hyatt Regency, St. Louis, Missouri, May 4 – 7, 2008.

**Attanayake, U.** and Aktan, H. M. "Macromechanical Modeling of Precast Orthotropic Bridge Deck Superstructure Systems," 86<sup>th</sup> *TRB Annual Meeting (CD – ROM), No: 07-3209*, January 21-25, 2007.

**Attanayake, U.**, Liang, X., Ng, S., and Aktan, H. “Penetrating Sealants for Bridge Decks – Selection Procedure,” *Journal of Bridge Engineering*, Vol. 11, No. 5, pp. 533-540, 2006.

**Attanayake, U.** and Aktan, H. M. “Side-by-Side Box-Beam Bridge - Performance and Design Issues,” *7<sup>th</sup> International Conference on Short & Medium Span Bridges*, Montreal, Quebec, Canada, August 23 – 25, 2006.

Ulku, A. E., **Attanayake, U.**, and Aktan, H. M. "Remaining Service Life Estimation of Bridge Components by Knowledge Discovery Techniques," *2006 NDE Conference on Civil Engineering*, St. Louis, Missouri, 14 – 18 August, 2006.

**Attanayake, U.** and Aktan, H. M. "Side-by-side box-beam bridges – design for durability", *Third International Conference on Bridge Maintenance, Safety and Management*, IABMAS 2006, Porto, Portugal, July 16 – 19, 2006.

**Attanayake, U.** and Aktan, H. M. "Durability Performance of Concrete Bridge Components," *The Second fib Congress*, Naples, Italy, June 5 – 8, 2006.

Gilbertson, C. G., **Attanayake, U.**, Ahlborn, T. M., and Aktan, H. "Prestressed Concrete Box-Beam Performance: Condition Assessment and Design Analysis," *85<sup>th</sup> TRB Annual Meeting (CD – ROM)*, No: 06-2432, January 22-26, 2006.

**Attanayake, U.** and Aktan, H. M. "Inspection based condition assessment for health monitoring of highway bridges," *BINDT Condition Monitoring 2005*, The British Institute of Non-Destructive Testing, Northampton, UK, July 18 – 22, 2005.

**Attanayake, U.**, Chowdhury, R., Yu, B., and Aktan, H. M. "Performance Evaluation of Side-by-Side Box-Beam Bridges in Michigan," *84<sup>th</sup> TRB Annual Meeting (CD – ROM)*, No: 05-0970, January 09-13, 2005.

Chowdhury, R., **Attanayake, A. M. U. B.**, and Aktan, H. M. "Non-Destructive Evaluation of Concrete Using Infrared (IR) Thermography for Void Detection and Moisture Evaluation by Numerical, Experimental, and Field Investigation," *84<sup>th</sup> TRB Annual Meeting (CD – ROM)*, No: 05-0710, January 09-13, 2005

**Attanayake, U.**, and Aktan, H. M. "Condition and durability assessment of concrete bridge superstructure components," *Second International Conference on Bridge Maintenance, Safety and Management*, IABMAS 2004, Kyoto, Japan, October 19 – 22, 2004.

**Attanayake, U.**, Duyar, O., and Aktan, H. M. "Early-Age Cracking Potential of Slip-formed Concrete Bridge Barriers," *83<sup>rd</sup> TRB Annual Meeting (CD – ROM)*, No: 04-2381, January 11-15, 2004.

Chowdhury, R., **Attanayake, A. M. U. B.**, and Aktan, H.M. "Heat Transfer Fundamentals Applicable to Infrared Thermography of Concrete Structures," *Proceedings of the 2003 Conference on Review of Progress in Quantitative NDE*, Vol. 23, Green Bay, Wisconsin, July 27-31, 2003.

**Attanayake, U.**, Duyar, O., Liang, X., Aktan, H. M. and Ng, K. Y. S. "Fundamentals of Use of Penetrating Sealants for Concrete Bridge Deck Protection," *82<sup>nd</sup> TRB Annual Meeting (CD – ROM)*, No: 03-2575, January 12 – 16, 2003.

### ***Other Papers and Abstracts***

Keil, M., Lamberson, L., **Attanayake, U.**, and Liou, W. "Modeling and Validation Testing of a Class 8 Tractor-Trailer." *Modeling & Simulation, Testing & Validation (MSTV) Conference*, Warren, MI, November 18-20, 2008. (Abstract submitted for review).

**Attanayake, U.** "Western Michigan University Concrete Canoe Team Stays Afloat with Abaqus." *INSIGHTS Magazine*, ABAQUS/Dassault Systèmes. (Article, accepted for publication).

**Attanayake, U.**, Bandara, N., and Aktan, H. M. "Laser Ultrasonic: A Novel Technology for Pavement Property Evaluation." *The 6<sup>th</sup> International Conference on Maintenance and Rehabilitation of Pavements and Technological Control*, Politecnico di Torino, Torino, Italy, July 8-10, 2009. (Abstract).

**Attanayake, U.**, and Aktan, H. M. "Condition Evaluation of Side-By-Side Precast Prestressed Concrete Box-Beam Bridges in Michigan," *ACI Convention Fall 2004*, San Francisco, California, October 24-28, 2004. (Abstract)

Abdul-Jabbar, M. A. R. M., Arafath, A. R. A., **Attanayake, A. M. U. B.**, and Ranaweera, M. P. "Analysis of Deep Beams with Openings," *Conference Proceedings (C-28)*, Sri Lanka Association of Advancement of Science (SLAAS), 1999. (Abstract)

### ***Research Reports***

Ahlborn, T. M., Aktan, H., **Attanayake, U.**, Deshpande, Y., and Evren, U. "Condition Assessment and Methods of Abatement of Prestressed Concrete Box-Beam Deterioration – Phase II," Report to the Michigan Department of Transportation, Detroit, MI 48226, September 2008 (*in preparation*).

**Attanayake, U.**, Aktan, H.M., and Ulku, A. E "Combining Link-Slab, Deck Sliding over Back-Wall and Revising Bearings," Report to the Michigan Department of Transportation, Detroit, MI 48226, August 2008.

Ahlborn, T. M., Aktan, H., **Attanayake, U.**, Gilbertson, C. G. "Condition Assessment and Methods of Abatement of Prestressed Concrete Box-Beam Deterioration – Phase I," *MDOT RC-1470, CSD 2005-09*, Report to the Michigan Department of Transportation, Detroit, MI 48226, November 2005.

Aktan, H.M., and **Attanayake, U.** “Causes and Cures for Cracking of Concrete Barriers,” *MDOT RC-1448, CSD 2003-01*, Report to the Michigan Department of Transportation, Detroit, MI 48226, August 2004.

Aktan, H.M., Fu, G., Dekelbab, W., and **Attanayake, U.** “Investigate Causes and Develop Methods to Minimize Early-Age Deck Cracking on Michigan Bridge Decks,” *MDOT RC-1437, CSD 2003-02*, Report to the Michigan Department of Transportation, Detroit, MI 48226, November 2003.

**Attanayake, U.**, Aktan, H.M., and Ng, S. “Criteria and Benefits of Penetrating Sealants for Concrete Bridge Decks,” *MDOT RC-1424, CSD 2002-03*, Report to the Michigan Department of Transportation, Detroit, MI 48226, December 2002.

### ***Web Publications***

Dr. Attanayake’s recent work with ABAQUS is presented on the following websites:

2. [http://www.simulia.com/academics/research\\_macromechanical.html](http://www.simulia.com/academics/research_macromechanical.html)
3. [http://www.simulia.com/academics/research\\_slabs.html](http://www.simulia.com/academics/research_slabs.html)
4. [http://www.simulia.com/academics/research\\_backwall.html](http://www.simulia.com/academics/research_backwall.html)
5. [http://www.simulia.com/academics/research\\_semi-trailers.html](http://www.simulia.com/academics/research_semi-trailers.html)
6. [http://www.simulia.com/academics/t\\_projects\\_canoes.html](http://www.simulia.com/academics/t_projects_canoes.html)