Resume of Professor Annalingam (Rajah) Anandarajah

Address: Dr. A. Anandarajah, Phoenix, Maryland, USA

Education

Ph.D. in Civil Engineering

University of California, Davis, 1982
Major: Geotechnical Engineering
Minors: (1) Structural Analysis and (2) Applied mathematics and numerical methods
Dissertation: "In situ prediction of stress-strain behavior of clays using electrical methods and bounding surface plasticity model"

M.S. in Civil Engineering

University of California, Davis, 1980
Thesis: "Centrifuge modeling of dynamic response of clay embankments"

B.Sc. in Civil Engineering

University of Sri Lanka, Peradeniya, 1977.

Work Experience

Academic Experience

2016 – Present: Adjunct Faculty, Penn State - Harrisburg
2016 – 2020: Adjunct Faculty, York College of Pennsylvania
6/90-7/99; 06/01-12/12: Program Chair, Civil Engineering Part-Time Graduate Program
7/95 – 12/12: Professor, The Johns Hopkins University (currently retired)
7/91 - 6/95: Associate Professor, The Johns Hopkins University.
7/84 - 06/91: Assistant Professor, The Johns Hopkins University.
6/82 - 5/84: Assistant Professor, South Dakota School of Mines and Technology.

Industry Experience

Assistant Engineer, Central Engineering Consultancy Bureau, Colombo, Sri Lanka,
One year in 1977
Engineering trainee in consulting companies
For a total period of one year starting between 1973 and 1977.

Other

Research Associate, U.S. Air Force Engineering and Services Center, Engineering Research Division, Air Base Serviceability Branch, Tyndall AFB, Panama City, Florida
Three months in 1984.

Teaching Interests and Experience

Between the South Dakota School of Mines and Technology (SDSM&T), Johns Hopkins University (JHU), Penn State Harrisburg, and York College of Pennsylvania, Professor Anandarajah now has over 35 years of teaching experience. As Professor Anandarajah has

background in both geotechnical engineering and solid mechanics, he has taught courses in both of these areas. Professor Anandarajah developed and taught the following courses over the years.

Undergraduate Courses Developed and Taught

- Soil mechanics (Theory and laboratory)
- Foundation Design
- Statics
- Structural Analysis
- Fluids
- Strength of materials
- Advanced soil mechanics
- Structural mechanics

Graduate Courses Developed and Taught

- Seepage and slope stability
- Numerical methods in geotechnical engineering
- Inelastic behavior of soils
- Fundamentals of soil behavior
- Earthquake soil-structure interaction
- Finite element method
- Theoretical and computational plasticity
- Advanced Foundation Design

Laboratory Development

The Johns Hopkins University had its engineering departments closed for about two decades, and restarted in the early 80's. Professor Anandarajah was one of the earliest faculty members of the newly established civil engineering department. As such, while there was plenty of laboratory space, it was up to the faculty member to develop and furnish equipment. Starting from scratch, Professor Anandarajah developed/purchased several pieces of equipment, which includes equipment necessary to conduct the full suit of undergraduate soil lab experiments (sieve analysis, hydrometer meter analysis, liquid and plastic limit tests, unconfined compression test, permeability test, direct shear test, triaxial test, consolidation test and compaction test), few visual setups (seepage tank, quicksand tank and bearing capacity tank) and the graduate soil mechanics laboratory (including triaxial, hollow-cylindrical and cubical testing machines, specialized setups for measuring electrical anisotropy of soils and testing contaminated soil, and fly-ash/soil specimens, etc.). Subsequently, some of his colleagues joined him and helped further enhance the laboratory.

Comments from Students Attesting to the Quality of Teaching

Course: Soil Mechanics (Theory and Lab)

43. What aspects of this course were the strongest?

Great teacher! One of the best professors that I've had at Hopkins.

43. What aspects of this course were the strongest?

The professor, Rajah, was the strongest aspect of this course. His professional background and wonderful personality helped me learn difficult material in this course. Always available for homework help.

43. What aspects of this course were the strongest? Rajah did a very good job presenting complicated Ideas.

43. What aspects of this course were the strongest?

The labs were enjoyable and cemented the material

43. What aspects of this course were the strongest?

Tests were fair and balanced, allowing students to show their understanding of the material. Never tried to "trick" the student. Homework was light.

43. What aspects of this course were the strongest?

clear lectures. Professor provided detailed answers to questions on homework & material.

Professional Activities

Chairmanships and Editorships

- Chair, Committee on Inelastic Behavior, ASCE Engineering Mechanics Division (1999/2001)
- Associate Editor, Journal of Engineering Mechanics, ASCE (1999/2001)
- Editorial Board Member, Journal of Geotechnical and Geoenvironmental Engineering, ASCE, 2004-2007
- Editorial Board Member, *Acta Geotechnica: An International Journal for Geoengineering*, Springer
- Guest Editor, Special Issue on Soil Dynamics, Journal of Soil Dynamics and earthquake Engineering, 2005
- Vice Chair, Inelastic Behavior Committee, Engineering Mechanics Division, ASCE, 1998/99

- Guest Editor, Special issue on constitutive modeling of geomaterials, J. Engineering Mechanics, ASCE, 130(6).
- Co-Editor, *Specilaty Publication: Computer Simulation of Earthquake Effects*, ASCE, GeoDenver 2000.

Society Memberships and Technical Committee Activities

- Member, ASCE (1982-2013)
- Member, International Association for Computer Methods and Advances in Geomechanics
- Member, Soil Properties Committee, Geotechnical Division, ASCE (1986-1993)
- Member, Inelastic Behavior Committee, Engineering Mechanics Division, ASCE, 1986-1996 1997-2013
- Member, Properties of Materials Committee, Engineering Mechanics Division, ASCE, 1998-present

As part of the activities of the Inelastic Behavior Committee and the Properties of Materials Committee, Professor Anandarajah has been organizing and/chairing several sessions each year for as long as he has been the member of these committees.

Review Services

Professor Anandarajah reviews papers submitted to about a dozen journals including J. Geotechnical and Geoenvironmental Engineering, ASCE, Geotechnique, Canadian Geotechnical Engineering Journal, Soils and Foundations, Clays and Clay Minerals, J. Colloid and Interface Sceince, ASTM Journal, J. Engineering Mechanics Division, ASCE, Computers and Geotechnics, International Journal of Analytical and Numerical Methods in Geomechanics, Acta Geotechnica, International Journal of Plasticity, International Journal of Earthquake Engineering and Soil Dynamics, Journal of Structural Engineering (ASCE), International Journal of Solids and Structures and Powder Technology

Professor Anandarajah reviews research proposals for various agencies including U.S. NSF, Army Research Office, and some foreign agencies such as the Hong Kong Research Council.

Local ASCE Activities

Professor Anandarajah has been active in the Maryland chapter of ASCE. He has served as the Member of Board of Directors during 1999-2002.

Other

- Professor Anandarajah has recently organized a workshop to assess the state-of-the-art of numerical modeling in geotechnical engineering, to determine the reasons for the lack of use of advanced numerical methods in geotechnical engineering and to develop methods for promoting the use of such methods in geotechnical practice. About 50 participants, including about 15 international participants, attended the workshop. One key factor cited by every participant was the need for updating the materials taught at the undergraduate level. Following up on this, Professor Anandarajah is working with about 20 researchers to develop a new undergraduate book (see the section of books).

- Secretary, Adjudication Committee, Joint NSF Velacs Project, 1991-1992.
- Member, International Advisory Committee, 12th IACMAG Conference (International Association for Computer Methods and Advances in Geomechanics), IIT Bombay, October 1-6, 2008.

Departmental/University Committee Activities

Professor Anandarajah has served in numerous committees over the years, some of which are listed below. His major responsibility for almost 16 of the 28 years with the Johns Hopkins University has been to manage the part-time graduate program for the Civil Engineering Department and to serve as advisor for the part-time graduate (master's) students (a total of about 25 students on average). The specific responsibilities include hiring part-time teachers, periodically evaluating the curriculum and enrollment and updating the curriculum, scheduling courses, reviewing applications and making admission decisions, helping market the program and advising the students throughout their tenure.

- Chair, Part-time Civil Engineering Graduate Programs
- Department Seminar Organizer
- Manager, Department computer system
- Department's Liaison to UG Admissions
- Served on University Wolman Graduate Fellowship Committee
- Served on University Curriculum Committee
- Served on University Courses-Overlap Committee
- Served on University Student Services Dean Search Committee
- Graduate Student Admission Committee
- Curriculum Revision Committee and Computer Literacy Committee
- Department safety officer
- Geotechnical laboratory coordinator
- Advisor: sophomores, juniors and seniors
- Served in several Department students' Ph.D degree committees
- Served as chair of several University Graduate Board Oral Exam committee for doctoral students
- Responsible for scheduling courses for the Department
- Served as Department's Library Liaison
- Chaired Search Committee for a Geotechnical Engineering faculty position in 1993
- Served on several university promotion/tenure committees

Research Interests and Accomplishments

Constitutive Modeling of Cohesive Soil

Professor Anandarajah has developed an anisotropic bounding surface elasto-plastic model to describe the stress-strain behavior of clays (Anandarajah and Dafalias, 1986). He has applied the model in many problems, including earthquake soil-structure interaction problems (e.g., Anandarajah et al., 1995b).

Constitutive Modeling of Granular Materials

Professor Anandarajah has been working on the development of rational constitutive models for granular materials for the past 15 years (e.g., Anandarajah, 1994a, 1994b). He has made successful predictions in the VELACS prediction exercise (Anandarajah, 1993: conference paper). His recent focus has been to develop constitutive models based on microstructural understanding. To this end, he has developed an elasto-plastic model with capabilities to simulate anisotropy and liquefaction behavior, called the sliding-rolling model (Anandarajah, 2004, 2008a, 2008b, 2008c).

Finite Element Modeling of Earth Structures and Pile-Soil Systems

Professor Anandarajah has developed his own finite element code and implemented all his constitutive models in it (along with some of the classical models such as the Von Mises model, the Drucker-Prager model and the modified Cam-clay model). He has used his finite element code in some consulting projects and some research projects (e.g., Anandarajah, 1995b; Anandarajah, 1994, 1995 & 2000c: conference papers).

Micromechanics of Soil

Professor Anandarajah has spent a significant portion of his research career in developing fundamental understanding of soil behavior with the intent to simplify and improve constitutive models. For example, he has developed discrete element method (DEM) of analysis techniques for analyzing clayey soils (Anandarajah, 1994c, 2000b; Anandarajah and Lavoie, 2002; Yao and Anandarajah, 2003). As part of developing the DEM procedures, he and his students have developed rational methods for quantifying inter-particle physico-chemical forces (Anandarajah and Lu, 1992; Lu and Anandarajah, 1992; Anandarajah and Chen, 1995, 1997; Chen and Anandarajah, 1996). Recently, he has pursued this avenue for understanding the behavior of granular materials (Anandarajah, 2008). In addition, he has developed a microstructural model for predicting the elasto-plastic behavior of sand based on inter-particle sliding and rolling, called the sliding-rolling theory (Anandarajah, 2004). This theory led to the phenomenological model described above (Anandarajah, 2008b).

Fundamentals of Soil

Anisotropy

There are many aspects concerning anisotropy of clays that are poorly understood. Professor Anandarajah and his students have used mechanical methods (e.g., scanning electron microscopy and image processing) and an electrical method to study the relationship between the evolution of the fabric anisotropy and the anisotropy based on the stress-strain behavior in different directions (Anandarajah and Kuganenthira, 1995; Kuganenthira et al., 1996; Anandarajah et al., 1996).

Critical State of Sand

Based on micromechanical studies and experimental data, Professor Anandarajah has recently provided new interpretation for the critical state of sand, which forms the corner stone of many liquefaction analysis procedures and numerous constitutive models (Anandarajah, 2004, 2008a).

Behavior of Contaminated Clay

To understand the effects of concentrated contaminants such as benzene, heptane, etc., on the stress-strain behavior and permeability of clays, Professor Anandarajah and his students have conducted several series of systematic experiments in the laboratory (Anandarajah and Zhao, 2000; Chen et al., 2000; Anandarajah, 2003a, 2003b). These studies have enhanced our understanding of the fundamentals of soil behavior.

Journal and Peer-Reviewed Publications

Anandarajah, A., Amarasinghe, P. M. and Ghosh, P. (2014). Molecular dynamic study of capillary forces on clay particles. *Appl Clay Sci*, 88-89(170).

Amarasinghe, P. M. and Anandarajah, A. (2013). Molecular Dynamic Study of the Swelling Behavior of Na-Montmorillonite. *Environmental and Engineering Geoscience*, 19(2), 173-183.

Anandarajah, A. and Amarasinghe, P. M. (2013). Discrete-element study of the swelling behaviour of Na-montmorillonite. *Géotechnique*, 63(8), 674-681.

Anandarajah, A. and Amarasinghe, P. M. (2012). Microstructural Investigation of Soil Suction and Hysteresis of Fine-Grained Soils. *J. Geotech. Engrg., ASCE*, 138(1):38-46.

Amarasinghe, P. M. and Anandarajah, A. (2012a). Behavior of Swelling clays: A molecular dynamics study, *GeoCongress 2012*, March 25-29, Oakland, California, (peer reviewed and accepted) 10 pages.

Anandarajah, A. and Amarasinghe, P. M. (2012b). Behavior of swelling clays: A discrete element study, *GeoCongress 2012*, March 25-29, Oakland, California, (peer reviewed and accepted) 10 pages.

Anandarajah, A. and Amarasinghe, P. M. (2011a). "Microstructural Investigation of Soil Suction and Hysteresis", *GeoFrontiers 2011*, March 13-16, Dallas, Texas, (peer reviewed) 9 pages.

Anandarajah, A. and Amarasinghe, P. M. (2011b). "Microstructural Investigation of Soil Suction and Hysteresis", *13th International Conference of the International Association for Computer Methods and Advances in Geomechanics*, *(IACMAG)*, May 9-11, Melbourne, Australia, (peer reviewed) 5 pages.

Anandarajah, A. and Locussol, C.. (2011c). "Study of the Fundamentals of Expansive Clays through Discrete Element Modeling", *GeoFrontiers 2011*, March 13-16, Dallas, Texas, (peer reviewed) 9 pages.

Amarasinghe, P. M., and Anandarajah, A. (2011d). "Influence of Fabric Variables on Clay-Water-Air Capillary Meniscus", *Canadian Geotechnical Journal*, 48, 987-995 (2011).

Anandarajah, A. (2008a). The critical state of granular materials based on the sliding-rolling theory. *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 134(1): 125-135

Anandarajah, A. (2008c). Modeling Liquefaction by Multimechnism Model. *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 134(7): 949-959

Anandarajah, A. (2008). Multi-Mechanism Anisotropic Model for Granular Materials. International Journal of Plasticity, 24(5):804-846 (Online version in 2007, and print version in 2008).

Anandarajah, A., Zhang, J. and Ealy, C. (2005). Calibration of dynamic analysis methods from field test data. *Soil Dynamics and Earthquake Engineering*, 25(7-10):763-772.

Anandarajah, A. (2004). Sliding and Rolling Constitutive Theory for Granular Materials. . *J. Engineering Mechanics, ASCE*, 130(6):665-681.

Anandarajah, A. (2003a). "Mechanism of Permeability Change Due to Change in Pore Fluid Chemistry." *J. Geotech. Engrg.*, ASCE, 129(2):163-172

Anandarajah, A. (2003b). Discrete Element Modeling of Leaching Induced Apparent Overconsolidation in Kaolinite, *Soils and Foundations.* 43(6):1-12

Yao, M., and Anandarajah, A. (2003). Three-Dimensional Discrete Element Method of Analysis of Clays. *J. Engineering Mechanics, ASCE*, 129(6):585-596.

Anandarajah, A. and Lavoie, D. (2002). "Numerical Simulation of the Microstructure and Compression Behavior of Eckernforde Bay Sediments." *Marine Geology*, Vol. 182:3-27

Anandarajah, A. (2000a). "On Influence of Fabric Anisotropy on the Stress-Strain Behavior of Clays." *Computers and Geotechnics*, 27:1-17.

Anandarajah, A. (2000b), "Numerical Simulation of One-Dimensional Behavior of Kaolinite." *Geotechnique*, 50(5):509-519.

Chen, J., Anandarajah, A. and Inyang, H. (2000). "Pore Fluid Properties and Compressibility of Kaolinite." *J. Geotechnical and Geoenvironmental Engineering*, ASCE, 126(9):798-807.

Anandarajah, A. and Zhao, D. (2000). "Triaxial Behavior of Kaolinite in Different Pore Fluids." *J. Geotechnical and Geoenvironmental Engineering*, ASCE, 126(2):148-156.

Anandarajah, A. (1999). "Multiple Time-Stepping Scheme for the Discrete Element Analysis of Colloidal Particles." *Powder Technology*, 106:132-141.

Chen, J. and Anandarajah, A. (1998). “Influence of Pore Fluid Composition on Volume of Sediments in Kaolinite Suspensions.” Clays and Clay Minerals, 46(2):145-152.

Anandarajah, A. (1997a). “Influence of Particle-Orientation on One-Dimensional Compression of Montmorillonite.” *J. Colloid Interface Sci*., 194(1):44-52.

Anandarajah, A. (1997b). “Structure of Sediments of Kaolinite.” *Engineering Geology*, 47:313-323.

Anandarajah, A. and Chen, J. (1997). “Van der Waals Attractive Force Between Clay Particles in Water and Contaminant.” *Soils and Foundations*, Japanese Society of Soil Mechanics and Foundation Engineering, 37(2):27-37.

Anandarajah, A., Kuganenthira, N. and Zhao, D. (1996). “Variation of Fabric Anisotropy of Kaolinite in Triaxial Loading,” *J. Geo. Engr. Div., ASCE*, 122(8):633-640.

Chen, J. and Anandarajah, A. (1996). “Van der Waals Attractive Force Between Spherical Particles,” *J. Colloid Interface Sci*., 180:519-523.

Kuganenthira, N., Zhao, D. and Anandarajah, A. (1996). “Measurement of Fabric Anisotropy in Triaxial Shearing,” *Geotechnique*, 46(3):657-670.

Anandarajah, A., Sobhan, K. and Kuganenthira, N. (1995a). “Incremental Stress-Strain Behavior of a Granular Soil,” *J. Geo. Engr. Div., ASCE*, 121(1):57-68.

Anandarajah, A. and Chen, J. (1995). “Single Correction Function for Retarded van der Waals Attraction,” *J. Colloid Interface Sci*., 176(2):293-300.

Anandarajah, A. and Kuganenthira, N. (1995). “Some Aspects of Fabric Anisotropy of Soils.” *Geotechnique*, 45(1):69-81.

Anandarajah, A., Rashidi, H. and Arulanandan, K. (1995b). “Elasto-Plastic Finite Element Analyses of Earthquake Pile-Soil-Structure Interaction Problems Tested in a Centrifuge.” *Computers and Geotechnics*, 17:301-325.

Anandarajah, A. (1994a). “Procedures for Elasto-Plastic Liquefaction Modeling of Sands,” *J. Engr. Mech. Div., ASCE*, 120(7):1563-1589.

Anandarajah, A. (1994b). “A Constitutive Model for Granular Materials Based on Associated Flow Rule,” *Soils and Foundations, Japanese Society of Soil Mechanics and Foundation Engineering*, 34(3):81-98.

Anandarajah, A. (1994c). “Discrete Element Method for Simulating Behavior of Cohesive Soils." *J. Geo. Engr. Div*, ASCE, 120(9):1593-1615.

Anandarajah, A. and Chen, J. (1994). "Double-Layer Repulsive Force Between Two Inclined Platy Particles According to Gouy-Chapman Theory." *J. Colloid Interface Sci*, 168:111-117.

Anandarajah, A. (1993). "Dynamic analysis of Axially-Loaded Footings in Time Domain." *Soils and Foundations*, Japanese Society of Soil Mechanics and Foundation Engineering, 33(1):40-54.

Lu, N. and Anandarajah, A. (1992). "Empirical Estimation of the Double-Layer Repulsion between Inclined Clay Particles of Finite Length." *J. Geo. Engr. Div*, ASCE, 118(4):628.

Anandarajah, A. (1992). "Numerical Study of Clay Anisotropy." *Journal of Engineering Mechanics Division*, ASCE, 118(1):211.

Anandarajah, A. and Lu, N. (1992). "Numerical Study of the Electrical Double-Layer Repulsion between Non-Parallel Clay Particles of Finite Length." *International Journal for Numerical and Analytical Methods in Geomechanics*, 15(10):683-703.

Anandarajah, A., and Agarwal, D. (1991). "Computer-Aided Calibration of a Soil Plasticity Model." *International Journal for Numerical and Analytical Methods in Geomechanics*, 15(12):835-856.

Anandarajah, A. and Lu, N. (1991). "Structural Analysis by the Distinct Element Method." *Journal of Engineering Mechanics Division*, ASCE, 117(9):2156.

Anandarajah, A. (1990). "Time-Domain Radiation Boundary for Analysis of Plane Love-Wave Propagation Problems." *International Journal of Numerical Methods in Engineering*, 29:1049-1063.

Anandarajah, A. and Dafalias, Y.F. (1986). "Bounding Surface Plasticity, Part 3: Application to Anisotropic Soils." *Journal of Engineering Mechanics Division*, ASCE, 112(12):1292-1318.

Anandarajah, A and Arulanandan, K (1985). Discussion to paper by D. V. Morris on "A Note on Earthquake-Induced Liquefaction." Geotechnique, 35(3):370.

Arulanandan, K., Anandarajah, A., and Abghari, A. (1983). "Centrifuge Modeling of Liquefaction Susceptibility." *J. Geo. Engr. Div*, ASCE, 109(3):281.

Arulanandan, K., Canclini, J., and Anandarajah, A. (1982). "Simulation of Earthquake Motions in the Centrifuge." *J. Geo. Engr. Div*, ASCE, 108(GT5):730.

Invited Lectures

Elasto-plastic soil-structure interaction. 15th U. S. National Congress of Theoretical and Applied Mechanics, Boulder, Colorado, 25-30, June 2006. (**Key Note Lecture**).

Generalized Liquefaction Model Based on Sliding Theory. *Proc. Joint ASME/ASCE/SES Conference on Mechanics and Materials* (McMAT2005), Baton Rouge, Louisiana, 2005, June 1-3rd (**Keynote Lecture**).

Field method for Estimating Soil Parameters for Nonlinear Dynamic Analysis of Single Piles. Proceedings of the 3rd Joint US/Japan Workshop on Soil-Structure Interaction, Menlo Park, California, March 29-30, 2004.

Numerical Methods for Seismic Analysis of Dams. International Workshop on Seismic Stability of Tailings Dams, Case Western reserve University, Nov. 10-11, 2003.

Cyclic Statnamic Testing of a Single Pile. Presentation in the Seismic Committee Meeting, Transportation Research Board Meeting, Washington, D.C, 2002.

"Constitutive Modeling of Soils." International Conference on Civil Engineering, Indian Institute of Science, Bangalore, India, 23-25 July, 2001 (**Keynote Lecture**).

"Constitutive Modeling of Soils." Columbia University, October 24, 2001.

"Mechanics and Physics of Clean and Contaminated Clays." New Jersey Institute of Technology, 13 March 1998.

"Earthquake-Induced Liquefaction of Sands: Constitutive Modeling and Fully-Coupled Analysis." National Institute of Standards and Technology (NIST), 13 November 1998

"Mechanics and Physics of Clays." Colorado School of Mines, 15 May 1998.

Anandarajah, A., "Discrete Element Simulation of the Microstructure of Marine Cohesive Sediments." Naval Research Laboratory, Stennis Space Center, August 25, 1996.

Anandarajah, A. "Elasto-Plastic Dynamic Finite Element Analysis of a Pile-Supported Structure." Department of Civil Engineering, University of California, Davis, October June 3, 1996.

Anandarajah, A. "Quantitative Analysis of Contaminated Clays with Special Consideration to van der Waals Attractive and Double-Layer Repulsive Forces." Department of Civil Engineering, University of California, Davis, October June 4, 1996.

Anandarajah, A., "Numerical Modeling of Earthquake Soil-Structure Interaction Problems." Workshop/Conference on Application of Numerical Procedures in Geotechnical Earthquake Engineering, University of California, Davis, October 28-30, 1996.

Anandarajah, A. "Interaction Between Clay Particles in a Fluid." Proc. intl. workshop on "Hydro-Thermo-Mechanics of Engineered Clay Barriers and Geologic Barriers", Montreal, Quebec, Canada, July 5-7, 1995.

Anandarajah, A., "Surface Interaction Between Clay Particles and Numerical Modeling of a System of Clay Particles." Proc. Workshop on Mechanics and Statistical Physics of Particulate Media, La Jolla, San Diego, June 8-10, 1994.

Anandarajah, A. and Bardet, J. P., "VELACS Project: A Critical Evaluation of Model 7 Predictions." Proc. Intl. Conf. on Verification of Numerical Procedures for the Analysis of Soil Liquefaction Problems, Davis, California, Oct. 17-20, eds. K. Arulanandan and R. F. Scott, Vol. 2, 1993.

Anandarajah, A.. "Research Needs in the Development of Numerical Procedures for Seismic Evaluations." NSF Sponsored Workshop on Geotechnical Research Needs for the Assessment and Mitigation of Infrastructure Deterioration in Response to Earthquakes, University of California, Davis, Feb., 1992.

Anandarajah, A., "Research Needs in Site Characterization." NSF Sponsored Workshop on Geotechnical Research Needs for the Assessment and Mitigation of Infrastructure Deterioration in Response to Earthquakes, University of California, Davis, Feb., 1992.

Anandarajah, A, "Quantification of Inter- and Intra-Cluster Void Ratios." Workshop on Site Characterization for the Reduction of Disasters' Toll, Sponsored by NSF and EPA, Held at the University of California, Davis, July 12-13, 1990.

Conference Papers and Presentations

Professor Anandarajah attends 1 to 3 conferences each year to participate in committee meetings and to present papers. In early conferences (prior to 1995), full-length or short papers were published by the organizers in the form of proceedings. Professor Anandarajah wrote numerous conference papers during this period, but most of them have eventually turned into full-length journal papers. The recent style (in most, but not all, cases) is to publish just the abstracts and to encourage the presenters to publish their work is journals. This style actually suits JHU since JHU does not give credit for conference papers.

Listed below are some key papers published only as conference papers:

Anandarajah, A. (2000c). "Fully-Coupled Analysis of a Single Pile Founded on Liquefiable Sands." *Specilaty Publication: Computer Simulation of Earthquake Effects*, ASCE, GeoDenver 2000.

Anandarajah, A. (1995). Verification of an Elasto-Plastic Earthquake Analysis Procedure'. *Proc. 3rd Int. Conf. on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics*, St. Louis, Missouri (ed. S. Prakash), University of Missouri-Rolla press, April 2-7, pp. 107-116.

Anandarajah, A. (1994). Effective Stress Procedure of Modeling Sand Liquefaction Problems. *Proc. Intl. Conf. Comp. Meth. in Stru. and Geo. Engrg*., Hong Kong, Dec. 12-14.

Anandarajah, A. (1993). VELACS Project: Elasto-Plastic Finite Element Prediction of the Liquefaction Behavior of Centrifuge Models Nos. 1, 3 and 4a. Proc. Intl. Conf. on Verification of Numerical Procedures for the Analysis of Soil Liquefaction Problems, Davis, California, Oct. 17-20, eds. K. Arulanandan and R. F. Scott, Vol. 1, pp. 1075-1104.

Book

- Anandarajah, A. (2010) Computational Methods in Elasticity and Plasticity: Solids and Porous Media, Springer, 652 pages

Edited Book Volumes

- Ling, H., Anandarajah, A., Manzari, M., Kaliakin, V. and Smyth, A. (2003). *Constitutive Modeling of Geomaterials*, CRC Press, 212 pages.
- Arulanandan, K., Anandarajah and X. S. Li (2000). *Specilaty Publication: Computer Simulation of Earthquake Effects*, ASCE, GeoDenver 2000.

Consulting Activities

Short Courses:

1. 501: Principles of Finite Element Method for Structural and Geotechnical Engineers. Baltimore, Maryland. July 10, 2014
2. 503: Constitutive Models for Geotechnical Analyses. Baltimore, Maryland. October 10, 2014.

Research Grants and Contracts Received

- "A Study of Clay Anisotropy," Principal Investigator, University grant, South Dakota School of Mines and Technology, 1983.
- "In Situ Calibration of Constitutive Models -- Feasibility Study," Principal Investigator, National Science Foundation, 2 yrs., 1985.
- "Engineering Research Equipment Grant: Generalized Geotechnical Testing Apparatus and Micro Computer System," Co-Principal Investigator, National Science Foundation, 1986.
- "Soil-Pile Response during the Santa Cruz Loma Prieta Earthquake," Collaborating with R. F. Scott and K. Arulanandan, 1990.
- "Experimental and Theoretical Studies of the Micromechanics of Clays," Principal Investigator, National Science Foundation, 2 yrs., 1991.
- "A Study of the Influence of Pollutants on Geotechnical Properties of Clays," Principal Investigator, National Science Foundation, 3 yrs., 1992.
- "Theoretical and Experimental Studies of Microstructural Processes Related to Inelastic Stress-Strain Behavior of Cohesive Soils," Principal Investigator, Air Force Office of Scientific Research, 3 yrs., 1993.
- "Quantification of the Change in Permeability Due to Contamination," Principal Investigator, National Science Foundation, 09/97-08/00.
- "Discrete Element Simulation of the Microstructure of Marine Cohesive Sediments," Principal Investigator, Naval Research Laboratory, 2yrs., 1996.
- "Cyclic Lateral Load Testing of Piles," Principal Investigator, Federal Highway Administration, 07/01/2000, 2 yrs.

- "Field Method for Back-Calculation of Dynamic p-y Multipliers and Damping," Principal Investigator, National Science Foundation, 07/01/2000, 3 yrs.
- Anandarajah, A., "Cyclic Lateral Load Testing of Piles," Federal Highway Administration, 02/01/2001 .
- "Suitability of Flyash/Cement/Soil for Use in Highway Pavements," Maryland State Highway Administration, 06/19/2002, 1 year.
- "Workshop on Nonlinear Modeling of Geotechnical Problems: From Theory to Practice", Principal Investigator, National Science Foundation, From 01-01-2004 to 12-31-2006.
- "Mechanisms Controlling Swelling of Clays", Principal Investigator, National Science Foundation, 09/01/2008, 3 yrs.
- A Fundamental Study on Suction and Hysteresis of Soil-Water Characteristic Relation of Cohesive Soil, National Science Foundation, 08/01/2010, 3 yrs.

Full-Time Graduate Students Advised

Name ; Degree ; Status ; School
Jigang Zhang ; M.S.; Graduated ; JHU
Gnanaranjan, G; M.S.; Graduated ; JHU
Wenbing Song ; M.S.; Graduated; JHU
Manchun Yao ; Ph.D; Graduated;JHU
Tom Gillard ; M.S.;Graduated ;JHU
Colleen Richardson; M.S. ;Graduted;JHU
Wenming Sun; M.S.;Graduated;JHU
N. Kuganenthira; Ph.D ;Graduated;JHU
Jianhua Chen; Ph.D ;Graduated ;JHU
Dong Zhao; Ph.D ;Graduated ;JHU
Hossein Rashidi; Ph.D ;Graduated ;UCD
Siva Kesavanathan; Ph.D ;Graduated;JHU
Ning Lu; Ph.D;Gradueted;JHU
Khaled Soban; M.S ;Graduated;JHU
Deepak Agarwal; M.S;Graduated;JHU
Prabhakar Thyagarajan; M.S;Graduated;JHU
Kabirul Islam; M.S;Graduated;JHU
Al Sain; M.S;Graduated;SDSM&T
Song-San Lee; M.S;Graduated;SDSM&T
Shi-Shen Tsai; M.S;Graduated;SDSM&T
Shih-Ping Lee; M.S;Graduated;SDSM&T
Haresh Senapathy; M.S;Graduated;SDSM&T

Post-Doctoral Fellow Mentorship

Dr. P. M. Amarasinghe, 2009-2012