



GIAN Course on **Seismic Soil – Pile Interaction**

August 05 to 09, 2019

Organised by

Department of Civil Engineering,

National Institute of Technology, Tiruchirappalli - 620015, Tamil Nadu, India

Overview

At present, due to the urbanization and globalization in the developing nations, the intensification in the infrastructure field has been reached at its peak. As a part of the infrastructure development, construction of onshore and offshore structures is inevitable these days. Most of such infrastructures are resting on pile foundations and it is subjected to both axial load from superstructure and lateral load from wind, wave and seismic activities. The load acting on a structure is dependent not only on the environment and location (for example wind, wave, temperature and unknowns related to climate change) but also on unpredictable natural hazards (for example Tsunamis and Earthquake and its associated effects such as subsurface liquefaction). In such cases, the soil mass which is surrounding the pile plays a key role in providing lateral support for the pile and hence studying the soil-pile interaction is necessary. The nature of pile-soil interaction is three dimensional and to complicate the problem further, the soil is a nonlinear and anisotropic medium.

The dynamic response of the structure itself would induce deformation of the supporting soil. This process, in which the response of the soil influences the motion of the structure and the response of the structure influences the motion of the soil, is referred to as Soil-Structure Interaction. These effects are more significant for heavy structures supported on relatively soft soils. For the light structures founded on stiff soil, these effects are generally small. To encounter these effects the detailed analysis about piles interacted with neighboring piles and soil mass is required.

This course will bring out the assumptions, theories and application methods for modeling soil-pile interaction for various typical field situations under earthquake loading. This course is highly specialized and is aimed at faculty members with limited experience in Soil-Pile Interaction, motivated undergraduate and postgraduate students in civil engineering. Practicing civil engineers will also find this course very helpful and refreshing. Course participants will learn these topics through lectures, hands-on tutorials, and case studies.

Dates for the course	August 05-09, 2019
Course Content	<ul style="list-style-type: none"> ➤ Axial capacity of a single pile, Pile capacity based on CPT testing, Pile base capacity, Shaft friction. ➤ Soil Liquefaction and Lateral Spreading - Modes of Pile Failure in Liquefiable Soils, Failure mechanisms for single pile and Failure mechanisms for pile groups

	<ul style="list-style-type: none"> ➤ Analysis of Laterally Loaded Piles under Static Conditions, Analysis of Laterally Loaded Piles under Earthquake Loading, Pile flexibility ➤ Inertial Response during earthquake, Relative stiffness of pile-soil system, damping coefficients - p-y Analysis of Piles ➤ Limit Equilibrium Analysis of Piles Subjected to Earthquake Loading, Limit equilibrium of piles in laterally spreading soils, Limit equilibrium analysis in the presence of non liquefied crust ➤ Liquefaction as a Foundation Hazard, Axial Load Transfer Due to Liquefaction, Liquefaction-induced (co-seismic), Downdrag (post-earthquake) ➤ Liquefaction-induced Lateral Spreading, Simple Methods to Estimate the Extent of Lateral Spreading, Effects of Lateral Spreading on Pile Foundations ➤ Recommendations on Estimation of Lateral Loads for Pile Design, Design Recommendations for pile foundation under lateral spreading ➤ Model creation to represent a pile in soil deposit using analysis program, representing the non-linearity of both soil and pile system. – Applying monotonic, cyclic and dynamic loading ➤ Comparing the results of monotonic, cyclic and dynamic loading on the pile-soil model with load – displacement curve etc. ➤ Hand on experience on PLAXIS and FLAC soil-structure interaction software – numerical simulation for SSI study
<p>You Should Attend if...</p>	<ul style="list-style-type: none"> • You are an executives, engineers and researchers from manufacturing, consultancy firm service and government organizations including R&D laboratories. • You are a student at M.E./M.Tech./MS/PhD or Faculty from reputed academic institutions and technical institution with Civil engineering background • You are a faculty teaching the subject pile foundation, soil-structure interaction <p style="text-align: center;">Number of participants for the course will be limited to fifty.</p>
<p>Course Fee</p>	<p>The participation fee for taking the course is as follows: Participants from abroad: US \$500, Participants from Industry : Rs.10,000 /- Government Research Organizations: Rs. 5,000/- Participants from Academic Institutions: Rs. 3,000/- (for faculty), Rs.2,000/- (for Full-Time Ph.D. Students), Rs.1,000/- (M.E./M.Tech./M.S. students)</p> <p>The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges and working lunch and refreshments. It will be very helpful if you can bring your laptop for the course.</p> <p>The participants may be provided hostel accommodation, depending on the</p>

	availability, on additional payment basis. Request for hostel accommodation may be submitted to: nandhukrishna42@gmail.com
How to Register	<p>Stage 1: GIAN Web (Portal) Registration: (Individuals who have already registered to GIAN earlier do not need to repeat)</p> <p>Visit GIAN Website at the link: http://www.gian.iitkgp.ac.in/GREGN/index and create login user ID and Password. Fill up the registration form and do web registration by paying Rs.500/- through online Net Banking/ Debit/ Credit Card. Please do not confuse GIAN web registration with course registration. The course registration fee is separate. The candidate has to pay course registration fee as per stage 3 given below.</p> <p>Registration to the GIAN portal is one-time affair and will be valid for lifetime of GIAN. Once registered in the portal, an applicant will be able to apply for any number of GIAN courses as and when necessary.</p> <p>Stage 2: Course Registration (Through GIAN Portal):</p> <p>Log in to the GIAN portal with the user ID and Password created in Stage 1. Click on “Course Registration” option given at the top of the registration form. Select the Course titled “Seismic Soil – Pile Interaction” from the list and click on “Save” option. Confirm your registration by Clicking on “Confirm Course”.</p> <p>Last date for Registration: 24th July, 2019</p> <p>Stage 3: Course Fee Payment (Only selected candidates):</p> <p>Only Selected Candidates will be intimated through E-mail by the Course Coordinator. They have to remit the necessary course fee in the form of DD drawn in favor of “The Director, NIT, Tiruchirappalli – 620015” payable at NIT-Tiruchirappalli. The DD along with the signed hard copy of the filled in application should be sent to the following address:</p> <p>Dr. K. Muthukkumaran Professor Department of Civil Engineering National Institute of Technology Tiruchirappalli – 620 015 E-mail: kmk@nitt.edu</p> <p>For any queries, you may contact: Mr. A. R. Nandhagopal Mobile : 9003721287 Email : nandhukrishna42@gmail.com</p>

The Faculty



Dr Gopal Madabhushi is a Professor of Civil Engineering at the University of Cambridge, UK and the Director of the Schofield Centre. He is the Head of Geotechnical and Geo-Environmental Group of the Department of Engineering at Cambridge. He has over 25 years of experience in the area of

Soil Dynamics and Earthquake Engineering. His expertise extends from dynamic centrifuge modelling to the time domain finite element analyses of earthquake engineering problems. He has an active interest in the areas of soil liquefaction, soil-structure interaction and liquefaction resistant measures and their performances. He has an active interest in the biomechanics of hip replacement surgeries. He has acted as an expert consultant to the industry on many geotechnical and earthquake engineering problems e.g. Mott MacDonald, Royal Haskonig and Ramboll-Whitby, UK. He has 150+ Journal Publications and 270+ papers in International conferences and workshops to date. He has authored a very successful book on the Design of Pile Foundations in Liquefiable Soils (Imperial College Press) and Geotechnical Chapters in the book on Designing to Eurocode 8 (Taylor & Francis). His new book on Centrifuge Modelling for Civil Engineers has been published by Spon Press/Taylor and Francis publishing group.



Dr. G. R. Dodagoudar is presently working as professor in the Department of Civil Engineering, Indian Institute of Technology Madras, Chennai, India. He obtained his Ph. D. from the Indian Institute of Technology Bombay, Mumbai, India. His areas of research interests

include: Inelastic analysis in geomechanics, Reliability analysis of geotechnical systems, Soil dynamics and earthquake engineering and, Seismic hazard and risk assessment. Professor Dodagoudar has guided so far 13 Ph. D. and 7 M.S. (Research) theses in addition to many M. Tech. dissertations. He has great passion for teaching and

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taught many UG and PG courses in the IIT Madras, Chennai. He publishes extensively in national and international referred journals. He is currently serving as a member of the editorial review board of a few journals. He has actively involved in many continuing education programmes. He is an active member of board of studies in many of the universities and he is also on the governing council in many of the Engineering colleges. He is an active member of the AICTE's, New Delhi, Standing Appellate Committee. Dr. Dodagoudar completed many prestigious sponsored research and consultancy projects.



Dr. K. Muthukkumaran is presently working as Professor at NIT Trichy. He obtained his Ph. D. from the Indian Institute of Technology Madras, Chennai, India. His area of research is in geotechnical engineering, which includes pile foundation, soil-structure interaction, marine geotechnics & foundations, field instrumentation, geotechnical physical modeling, ground improvement and forensic geotechnical engineering. He has published more than 100 papers in international and national journals and conferences. He has guided 5 (guiding 6) Ph.D., 4 MS and 35 Postgraduate theses. He received DST Young Scientist Award and IGS-Smt. Indra Joshi Biennial award by IGS Delhi. Ministry of Housing and Urban Poverty Alleviation has appointed him as External Expert Reviewer of HUDCO (Tamil Nadu) Projects. He has completed 5 R & D (including ISRO - Chandrayaan- 2 Mission project) and 35 major consultancy projects. He has delivered 50 invited/guest lecturers and organized 7 workshop/short term courses in Geotechnical Engineering. He is the Founder Chairman of Indian Geotechnical Society (IGS-Trichy) Trichy Chapter. He is a member of ISSMGE –TC-301. He is an active consultant in geotechnical engineering. He has completed more than 35 consultancy projects for various industries.

For any Queries

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