AN INTRODUCTION TO CONTINUUM STRUCTURAL AND TOPOLOGY OPTIMIZATION FOR ENGINEERS

Overview

Topology optimization, first introduced by Bendsoe as early as 1989, has matured over the last several decades and has had a profound influence on engineering design optimization. The method itself consists of optimizing material distribution/layout in two or three dimensions so as to maximize the overall performance, example, finding the density distribution over a voxel grid for a chosen volume fraction under a prescribed set of external loads and boundary conditions.

It has theoretical implications not only in the fields of mathematics, mechanics, multi-physics and computer science, but also very important practical applications in design and manufacturing (automobile, aerospace and construction) industries. With the increase in computing resources, the field will have a significant role in micro- and nano-technologies, as well as in defence, where the method is used today to design meta-materials for defence applications. The direct use of topology optimization in industrial design has virtually exploded with the increasing popularity of additive manufacturing methods, especially 3D printing, which allows the "single step" production of virtually any complex structural or mechanical component.

Dates	**17 to 22 August, 2023**
Place	**Department of Civil Engineering, National Institute of Technology Silchar, Assam, India**
Modules	A: Continuum Mechanics, Numerical Methods, Numerical Computing with MATLAB: Aug 17 - Aug 18 B: Optimization methods, Basics of Topology Optimization: Aug 19 - Aug 21 C: 3D Topology Optimization, Problem Solving Sessions: Aug 21 - Aug 22
Who can attend	I) Students at all levels (BTech/MSc/MTech/PhD), both undergraduate as well as postgraduate of NIT Silchar and other technical institutions. ii) Executives, engineers and researchers from manufacturing, service and government organizations including R&D laboratories.
Fees	The participation fees for taking the course is as follows: **Participants from abroad : US $500** **Industry/ Research Organizations: Rs. 10000** **Academic Institutions: Rs.5000(Faculty)|Rs.1000 (Students)** **NIT Silchar: Rs. 500 (PhD & PG) | NIL (UG)** The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants may be provided with accommodation on payment basis.
Benefits from the courses	I) Participants will learn the concepts of continuum mechanics and numerical analysis in practical engineering problems. ii) Participants will develop and implement learning algorithms for topology optimization for engineering problems iii) Participants will able to interpret and analyze the properties of optimization formulations and algorithms iv) Participants will perform topology optimization for large-scale structural design problems and report on their findings

The Faculty

Balaji Raghavan is a tenured Associate Professor of Civil and Mechanical Engineering at the *Institut National des Sciences Appliquees* (INSA) at Rennes in France. He conducts his research in the fields of machine learning, topology optimization and multi-scale modeling of materials in the *Laboratoire de Genie Civil et Genie Mecanique* (LGCM). He obtained his Bachelor of Technology in Mechanical Engineering from the *Indian Institute of Technology-Bombay*, followed by a Master of Sciences in Mechanical Engineering with a minor in High Performance Computing from the *Pennsylvania State University* (PSU) USA and his PhD in Advanced Mechanics from the *Universite de Technologie de Compiegne* (UTC) France. He is actively involved in international research collaborations with multiple countries including India. He serves as scientific reviewer for various reputed international journals.

Subhrajit Dutta is an Assistant Professor in the Department of Civil Engineering at National Institute of Technology Silchar. He completed his PhD in Civil Engineering from Indian Institute of Technology Bombay in 2017, where he was a recipient of the MHRD (GoI) scholarship for Graduate study. Subhrajit received his Bachelor of Technology degree in Civil Engineering from National Institute of Technology Silchar in 2010. He was working as an Assistant Professor in NIT Meghalaya after his PhD, and joined his position at NIT Silchar in June, 2018. Subhrajit's research group (Risk & Uncertainty Group) is currently working in the domain of computational science and engineering towards achieving few sustainable development and goals. Subhrajit is the Associate Editor of Practice Periodical on Structural Design and Construction, ASCE and the Guest Editor for ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering, and many reputed journals.

Course Co-ordinator

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Registration Guidelines (Step-by-Step):

1. First, 'web register' at GIAN 'Courses Registration Portal': http://www.gian.iitkgp.ac.in/GREGN/index by paying the requisite fees in the GIAN portal. If you're already registered, skip this step.

2. Then, log in, click 'Course Registration' tab on the GIAN Portal, and 'check box' to select this course **(#191031L01) "AN INTRODUCTION TO CONTINUUM STRUCTURAL AND TOPOLOGY OPTIMIZATION FOR ENGINEERS"** from the list. Click 'save' to register, and 'Confirm Course(s)' to confirm.

3. Now, pay the requisite Course Fee online in favour of the Director, NIT Silchar, A/C No: 10521277057, IFSC Code: SBIN0007061, MICR Code: 788002004. OR You can obtain DD in favour of Director NIT Silchar, Assam, India. Keep the payment info (DD details, transaction # & date) handy. You'll need this during the next step. Also, please retain the receipt for on-spot submission.

4. Next, fill out the Registration form given below, sign it. Send the scan copy of the filled in form with scanned copy of course fee transaction slip/DD to the course coordinator e-mail address (subhrajit.nits@gmail.com or subhrajit.dutta@civil.nits.ac.in). This is for the Course Coordinator's record. Now, await the Course Coordinator's confirmation.

P.S: Registering on the GIAN portal does not guarantee participation in the course. Please do not confuse with web registration with course registration. You might have been 'shortlisted' after paying the 500/-, but your selection is subject to paying the requisite course fee to NIT. For successful enrolment, makesure you've made both the payments. Number of participants for the course is limited to 50, and the registration will be open till the seats are filled. For queries and clarifications, write to the Course Coordinator at: subhrajit.nits@gmail.com or subhrajit.dutta@civil.nits.ac.in.

GIAN: Global Initiative of Academic Network
Name of the course: AN INTRODUCTION TO CONTINUUM STRUCTURAL AND TOPOLOGY OPTIMIZATION FOR ENGINEERS
(Course ID: 191031L01)
Dates: 17 – 22 August, 2023
Department of Civil Engineering, NIT Silchar, Assam, India

REGISTRATION FORM

GIAN Portal Application Number:

Full Name: Category (Industry/Academic/Student):

Organization:

Address:

Email Id:

Mobile Number:

Highest Academic qualification:

Payment option and details:

    a. **Demand draft:**

Draft No.	Bank	Date	Amount

    b. **Online transaction**

Transaction Id/Ref No	Bank	Date	Amount

Accommodation Required: Yes/No (please tick in the applicable field)

Date:

Place:

Signature of Applicant