
Advanced Design Concepts and Practice (ADCP)

ADCP 2014 Winter Workshop

Multidisciplinary Design Modeling and Analysis

Venue: Meeting room 4304, Building 9003, Tsinghua University, Beijing, China

Time: 9.45am-6.00pm, 17 November 2014

http://adcp2012.com/Page_6.html

Chairs

Prof. Ji Lihong Prof. Chen Liping
Tsinghua University Huazhong Univ. of Science & Technology

Keynote Speaker

Prof. Offer Shai, Tel Aviv University, Israel

Lecture Topic

Multidisciplinary Combinatorial Approach in Design and Analysis

Panelist

Prof. Chen Liping, Director of HUST CAD, Huazhong University of Science and Technology
Prof. Wu Zhongyi, Huazhong University of Science and Technology
Dr. Zhou Fanli, Tong Yuan Company
Prof. Wang Junying, CAD Center, Tsinghua University
Dr. Hou Yuemin, Design Institute, Tsinghua University

Language: English, Chinese

Sponsor

Oversea Collaborative Innovation Team Project of Tsinghua University
清华大学重点学科高水平国际合作创新团队项目

Organizer

Design Institute, Mechanical Engineering Department, Tsinghua University

Registration

Register the workshop by sending an email to Hou Yuemin through hym0@mails.tsinghua.edu.cn with subject ADCP2014 Winter. No registration fee will be charged. Materials are available for registered participants.

Contact

Dr. Hou Yuemin
Room 3408, Design Institute, Mechanical Engineering Department
Tsinghua University, Beijing, 100084
Tel: 86(10) 62773470, Email: hym01@mails.tsinghua.edu.cn

Introduction to the Workshop

The goal of ADCP workshops is to bring advanced theories, methods, technology and tools to the design and evaluation of complex systems, with a focus on computational design and evaluation methods and tools. ADCP2014 Winter Workshop offers an opportunity for discussing theories and methods of multidisciplinary design modeling and analysis and their applications.

The first Advanced Design Concepts and Practice (ADCP) workshop was held in Beijing on July 6-8th of 2011. The second ADCP Workshops was held in Karlsruhe, Germany, on May 8th of 2012. ADCP Summer workshop held at Tsinghua University on August 16th, 2013. In 2012, three web-based ADCP workshops also were organized, one is ADCP2012 Summer Workshop held at TU Delft on August 17th and the second is ADCP2012 Fall Workshop held in Beijing on November 8th and the third one is ADCP2014 Spring Workshop held in Beijing in 2014. ADCP 2014 workshop held in Stuttgart, Germany, 26 September 2014.



Introduction to the keynote speaker

Prof. Offer Shai, Ph.D
Associate Professor
Dept. of Solid Mechanics, Materials and Structures
Faculty of Engineering
Tel Aviv University, Israel



Prof. Shai received a Ph.D. (Summa Cum Laude) degree in mechanical engineering from Ben Gurion University. Before, during and after his studies he has worked on fertilizing theoretical ideas that have implications for practical applications. Before university, he studied practical mechanical engineering in Ort and during his academic studies he spent almost three years taking courses in computer science at Ben Gurion University and the Weizmann Institute. The strong mathematical background he established enabled him to employ advanced mathematical techniques in engineering and also to work both with mathematicians and researchers in engineering. Shai received the A.T. Yang Memorial Award twice (2005 and 2010) in Theoretical Kinematics in the ASME conference. In addition, he received an outstanding award for best paper together with Reich, Hatchuel and Subrahmanian in ICED'09.

The first talk will be: Multidisciplinary combinatorial approach in design and analysis. The second talk will be on: The Outcomes and Practical Applications of the Multidisciplinary Combinatorial Approach (MCA). In this talk we will introduce several results derived from MCA. Due to the duality of mechanisms and trusses a new type of force was revealed, called face force. This type of force has unique physical properties that are useful in many practical applications, such as: characterizing of singularity of robots and more.

One of the main results is revealing topological building blocks of almost all mechanical and biological systems, also called the system genes. Once we know to derive all of them we can have a method for synthesis the topological systems. Other topics that will be mentioned in this talk are: Knowledge Engineering Genome, a multidisciplinary perspective on tensegrity systems and more.

Reference

Lecture 1

1. Shai O., "The Multidisciplinary Combinatorial Approach and its Applications in Engineering", AIEDAM – AI for Engineering Design, Analysis and Manufacturing, Vol. 15, No. 2, pp.109-144, April, 2001.
2. Shai O., "The Duality Relation between Mechanisms and Trusses", Mechanism and Machine Theory, Vol. 36, No. 3, pp. 343-369, March, 2001.
3. Shai O. and Reich Y., "Infused Design: I Theory", Research in Engineering Design, Vol. 15, No. 2, pp. 93-107, 2004.
4. Shai O., Reich Y. and Rubin D., "Creative Conceptual Design: Extending the Scope by Infused Design", Computer-Aided Design, Vol. 41, No. 3, pp. 117-135, 2009.

Lecture 2

5. Shai O., "Utilization of the Dualism between Determinate Trusses and Mechanisms", Mechanism and Machine Theory, Vol. 37, No. 11, pp. 1307-1323, November, 2002.
6. Shai O. and Polansky I., "Finding Dead-Point Positions of Planar Pin-Connected Linkages through Graph Theoretical Duality Principle", Journal of Mechanical Design, Spatial Mechanisms and Robot Manipulators, Trans. ASME, Vol. 128, No. 3, pp. 599-609, May, 2006.
7. Servatius B., Shai O. and Whiteley W., "Combinatorial Characterization of the Assur Graphs from Engineering", European Journal of Combinatorics, Vol. 31, No. 4, May, pp. 1091-1104, 2010.
8. Shai O., "Topological Synthesis of All 2D Mechanisms through Assur Graphs", ASME Design Engineering Technical Conferences, August 15-18, Montreal, Quebec, Canada, 2010. A.T. Yang Memorial Award in Theoretical Kinematics.

Program

Monday 17th, 2014		9.45am-6.00pm	
Time	Topics	Speakers	
9.45-10.00am	Welcome and Introduction	Chair Prof. Chen Liping	
	Session 1	Chair Prof. Chen Liping	
10.00-11.45am	Multidisciplinary Combinatorial Approach in Design and Analysis	Keynote speaker Prof. Offer Shai	
11.45am-13.30pm	Lunch Break		
	Session 2	Chair: Prof. Ji Linhong	
13.30-15.15pm	Applications of the Multidisciplinary Combinatorial Approach (MCA) (a new type of force: face force and system genes) Knowledge Engineering Genome (a multidisciplinary perspective on tensegrity systems)	Keynote speaker Prof. Offer Shai	
15.15-15.30pm	Coffee break		
15.30-18.00pm	Discussion	Chair Prof Ji Linhong	
	New methods and tools for modeling products Design and analysis Tools Design examples Research Collaboration	Panelist Prof. Offer Shai Prof. Chen Liping Prof. Wu Zhongyi Dr. Zhou Fanli Prof. Wang Junying Dr. Hou Yuemin	
6.00pm	Adjourn		