# Computation in Architectural Design and Engineering

Tutors: Jianguo Cai, Daniel Sang-Hoon Lee, Paul Nicholas, Martin Petrov

## Objective

The main objectives of the workshop can be summarised as below:

1. Through a series of hand-on tutorials, the use of the graphical algorithm plug-ins, Grasshopper (Kangaroo + Karamba) for the early conceptual development in architectural design and engineering projects will be demonstrated.
2. The workshop will address the specific of discrepancy between the conceptual level analysis and later verification level analysis.
3. The workshop will generate a number of research topics, which will be developed and finalised towards collaborative journal publication.

## Duration

The workshop will take place from the ***June 25th to July 6th***. Thus, it is a two-week workshop.

## Requirements

The student must bring their laptops with pre-installed Rhino with Grasshopper (Kangaroo + Karamba) plug-ins.

It is also recommended for the participants to try the software before joining the workshop.

## Participants

The workshop is mainly devised for minimum postgraduate level researchers, whom would like to work in multi-disciplinary contexts with architectural design, civil and structural engineering. However, as the tutorials are devised for people with no previous knowledge of the tools, participants at various experience levels from other disciplines are also welcome to join, as there are no specific restrictions in joining workshop.

## Plan

## WEEK 1: Lectures and Tutorial

Day 1

10:00 – 10:45 Introduction (workshop description) and Welcome Lecture by Daniel Sang-Hoon Lee

11:00 – 11:45 Lecture Martin

12:00 Lunch

13:00 – 17:00 Introduction to Grasshopper Tutorial by Martin Petrov

* Simple examples and hands on exercise for students

Day 2

09:00 – 09:45 Assignment

10:00 – 10:45 Lecture Paul Nicholas

11:00 - 12:00 Grasshopper Tutorial by Martin

12:00 Lunch

13:00 – 17:00 Assignment

Day 3

09:00 – 09:45 Assignment

10:00 – 10:45 Lecture Jianguo Cai

11:00 - 12:00 Review of the common problems in Day 2

12:00 Lunch

13:00 – 17:00 Grasshopper + Kangaroo Tutorial by Martin

Day 4

09:00 – 09:45 Presentation by SEU lab student

10:00 – 10:45 Review of the common problems in Day 3

11:00 – 12:00 Grasshopper + Kangaroo + Karamba Tutorial by Martin

12:00 Lunch

13:00 – 17:00 Assignment

Day 5

09:00 – 09:45 Presentation by SEU lab student

10:00 – 10:45 Review of the common problems in Day 4

11:00 – 12:00 Summary

12:00 Lunch

13:00 – 17:00 Q&A and Closing of Week 1

## WEEK 2: Research and Paper Publication Plan

Day 1:

10:00 – 17:00 Researchers’ Meeting for Week 2:

1. Collaborative researcher topics
2. Responsible researcher for each topic
3. Work contribution
4. Journal publication plan

Day 2:

09:00 – 10:00 Pre-meeting: Jianguo, Paul, Martin, Daniel

10:00 – 17:00 Discussion over the origami simulation result: Grasshopper vs ABAQUS

1. Elemental Design
2. Boundary Conditions
3. Load specification
4. Calculation Methods /Algorithms
5. Simulation result
6. Main reasons for the discrepancy
   1. The difference in stress and strain calculation
   2. Selective detail analysis during dynamic simulation

Day 3:

09:00 – 10:00 Pre-meeting: Jianguo, Paul, Martin, Daniel

10:00 – 12:00 Current Agendas

12:00 Lunch

13:00 – 17:00 Future Improvement Strategies

Day 4:

09:00 – 10:00 Pre-meeting: Jianguo, Paul, Martin, Daniel

10:00 – 12:00 Selection of Research Topics

12:00 Lunch

13:00 – 17:00 Distribution of Work Packages

Day 5:

09:00 – 10:00 Pre-meeting: Jianguo, Paul, Martin, Daniel

10:00 – 12:00 Journal Publication Strategies/Plan

12:00 Lunch

13:00 – 17:00 Funding Opportunities