MATHEGRAM

Advanced Training Course 1

November18th to 22th, 2019, Graz

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Web Resources

Course website

https://www.tugraz.at/institute/ippt/publikationen-events/mathegram-atc1/

The detailed description of the "MATHEGRAM" partners are available on

https://www.surrey.ac.uk/mathegram/partners

The members of the project are described on

https://www.surrey.ac.uk/mathegram/people

For further description of the "MATHEGRAM" project, please follow
https://www.surrey.ac.uk/mathegram

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Local Organising Committee

Ranjan Dhakal (Graz University of Technology, AUT)
Stefan Radl (Graz University of Technology, AUT)

About Graz

Locations

The venue for the ACT1 is located in the Inffeldgasse Campus of the Graz University of Technology.

The exact location of the lecture rooms can be found via https://online.tugraz.at (search for rooms)

Transport & Tram

You can walk most distances in Graz. For longer distances you may want to take the tram. Note, the tram is FREE in the inner city (main to Jakomini square + 1 Stop, see the "Altstadtbim" sticker and our **"About Graz" page**).

Technicalities

Electricity is supplied at the European standard (220 volts A/C, 50 Hz, two round pin type outlets).

Shops are typically open from 07:30 to 19:00 hrs, Monday through Friday, and 07:30 to 18:00 on Saturdays. Only at main station and the airport you will find shops that are open on Sundays (typically 6:00 to 22:00 hrs).

Emergency: dial 112, this number works even on cell phones without a SIM card. Calls are answered in German and also in English. Direct numbers are:

122 - fire brigade
133 - police
144 - rescue/ambulance

Content Overview

Module 1: Fundamentals (2 ECTS, approx. 50 hrs workload)

1.1 Intro and Particles

A. Fundamentals of particle technology and engineering (Radl, TUG)

B. Micro-mechanical analysis of granular systems (O'Sullivan, IC)

C. Capillary phenomena and hygroscopic powders (Ramaioli, SU)

1.2 Numerical Methods

A. Finite element methods for heat transfer (Zarate, CIMNE)

B. Particle finite element analysis (Pouplana, CIMNE)

C. DEM and CFD-DEM modelling (Kloss, DCS)

D. DEM model calibration (Weiler, BASF)

1.3 Theory versus experiments

A. X-ray computed tomography (Villanova, ESRF)

B. The mu(I) granular rheology (Jop, SVI)

C. Stress analysis for stored grains (Barletta, UNISA)

D. Mechanical characterization of granular systems (Poletto, UNISA)

5 Keynote Lectures

Module 2: Coding (1 ECTS, approx. 25 hrs workload)

2.1 Software Usage

A. Basic Python programming (Jop, SVI).

B. LIGGGHTS Introduction (Stefan Radl, TUG)

C. How to use Kratos (Pouplana, CIMNE)

2.2 Software Management and Coding Project

A. Intro to MOOCS (Ramaioli, SU)

B. Version control and management (Mayrhofer, DCS)

C. Repository and user management (Mayrhofer, DCS)

D. Coding project (Stefan Radl, Josef Tausendschön, TUG; Arno Mayrhofer, DCS)

1 Keynote Lecture

Schedule

Sunday Reception (Nov 17)

19:00 – 21:00 Evening reception [Wirtshaus Glöckl Bräu, Graz City Center]

Training Day 1 (Nov 18)

8:30 – 8:55 Introduction and Overview [Room: i8] – Wu and Radl

9:00 – 10:30 Mechanical characterization of granular systems [Room: i8] - Poletto

10:30 – 11:15 Keynote [Room: i8] - Poorsolhjouy

11:15 – 12:00 LUNCH [Foyer i8/i9]

12:00 – 13:30 Stress analysis for stored grains [Room: MBEG220] - Barletta

13:30 – 15:00 Fundamentals of particle technology and engineering [Room: MBEG220] - Radl

15:00 – 15:15 COFFEE

15:15 – 16:45 Coding project Intro and team formation [Room: MBEG220] - Radl

Training Day 2 (Nov 19)

8:30 – 9:45 Powder flowability: theory and measurement [Room: MBEG220] – Hare

9:45 – 10:30 Keynote [Room: MBEG220] - Ulz

10:30 – 11:30 LIGGHTS Intro & Coding project hands on [Room: MBEG220] - Radl

11:30 – 12:15 LUNCH [Mensa]

12:15 – 13:45 Micro-mechanical analysis of granular systems [Room: MBEG220] – O'Sullivan

13:45 – 15:15 The mu(I) granular rheology [Room: MBEG220] - Jop

15:15 – 15:30 COFFEE

15:30 – 17:45 Basic Python programming [Room: SZ02053] - Jop

Training Day 3 (Nov 20)

8:30 – 10:00 PFEM [Room: MBEG220] - Pouplana

10:00 – 11:30 FEM in heat transfer [Room: MBEG220] - Zarate

11:30 – 12:15 LUNCH [Foyer i8/i9]

12:15 – 13:00 Keynote [Room: i9] - Kloss

13:00 – 13:10 Short Break

13:10 – 14:45 DEM and CFD-DEM Modeling [Room: MBEG220] - Kloss

14:45 – 14:55 COFFEE

14:55 – 16:10 Project meeting with ESR's presentations [Room: MBEG220] - Wu, ESRs

16:10 – 17:40 Supervisory Board meeting [Room: MBEG220] - Wu

Free coding possible for ESRs in room SZ02053 from 16:15 to 18:00 hrs - Dhakal

Training Day 4 (Nov 21)

8:30 – 10:45 Kratos Coding [Room: SZ01070] – Pouplana

10:45 – 11:30 Keynote [Room: SZ01070] - Khinast

11:30 – 12:15 LUNCH [Mensa]

12:15 – 13:00 Keynote [Room: SZ01070] - Pirker

13:00 – 14:00 Version control and management [Room: SZ01070] - Mayrhofer

14:00 – 14:45 Repository and user management [Room: SZ01070] - Mayrhofer

14:45 – 15:00 COFFEE

15:00 – 16:30 DEM/CFDEM calibrations in an industrial context [Room: MBEG220] - Weiler

Training Day 5 (Nov 22)

8:30 – 9:00	Data analysis using Orange (introduction) [Room: SZ02053] - Radl
9:00 – 10:00	Free Coding [Room: SZ02053] - Dhakal
10:00 – 11:00	Intro MOOCs [Room: MBEG220] - Ramaioli
11:00 – 11:30	Intro MOOCs students task [Room: MBEG220] - Ramaioli
11:30 – 12:15	LUNCH [Mensa]
12:15 – 14:45	Capillary phenomena and hygroscopic powders [Room: MBEG220] - Ramaioli
14:45 – 15:00	COFFEE
15:00 – 15:45	Keynote [Room: MBEG220] - Schütz
15:45 – 17:15	X-ray tomography: Intro, nano-scale specificities & applications [Room: MBEG220] - Villanova

Practical Information

Reports

ESRs have to issue a report documenting a key learning outcome of their participation in ATC1. This report will be graded (this is necessary for some Universities to accept ATC as an official doctoral training course).

Available Hardware

- Desktop PCs (Win10 Ent N, 64-bit, Intel Core i5-6500 CPU, 3.2 GHz, 16 GB RAM)
- Supervisor monitor at each desk (only VGA Connector for supervisors/presenter available!)
- Wifi (eduroam), Wifi TU Graz guests (username and password upon request at the location)
- XEON workstation "JAKKU10" (OpenSUSE OS)

Available Software

- Anaconda Scientific Python 4.3.1
- Spyder 3.1.2, Python 3.6.0 64bits, Qt 5.6.2, PyQt 5
- LIGGGHTS Public 3.8.0 (on XEON workstation, IP address, login and password will be provided)
- Paraview 5.4.1
- FreeCAD 0.18
- NetBeans IDE 8.0.1
- Matlab R2017b