GEO.MG1.7UF Selected Topics in Mineralogy/ Applied Mineralogy

27.03. bis 29.03.2019

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Course title: ''Practical Numerical Methods and Algorithms with Octave/Matlab''

Course description

The course will train students on how to solve common partial differential equations and what solution strategies can be applied to simulate physical and chemical processes, with general engineering examples taken from field of building materials.

Students will learn how to implement numerical methods into algorithms for their own research. The course will provide a full solution strategy approach, i.e. from a schematization and discretization of a physical problem, to a hands-on programing code implementation with Octave/Matlab and a graphical presentation of a numerical solution.

Aims (agenda)

Train students on theory and practical implementation of following numerical algorithms with Octave/Matlab:

- Day 1 (27.03.2019)
  Explicit Finite Difference (FD): transient diffusion.
- Day 2 (28.03.2019)
  Implicit solving system of algebraic equations: FD versus Method of Lines.
- Day 3 (29.03.2019)
  Particle models: cement hydration reaction kinetics and microstructural evolution

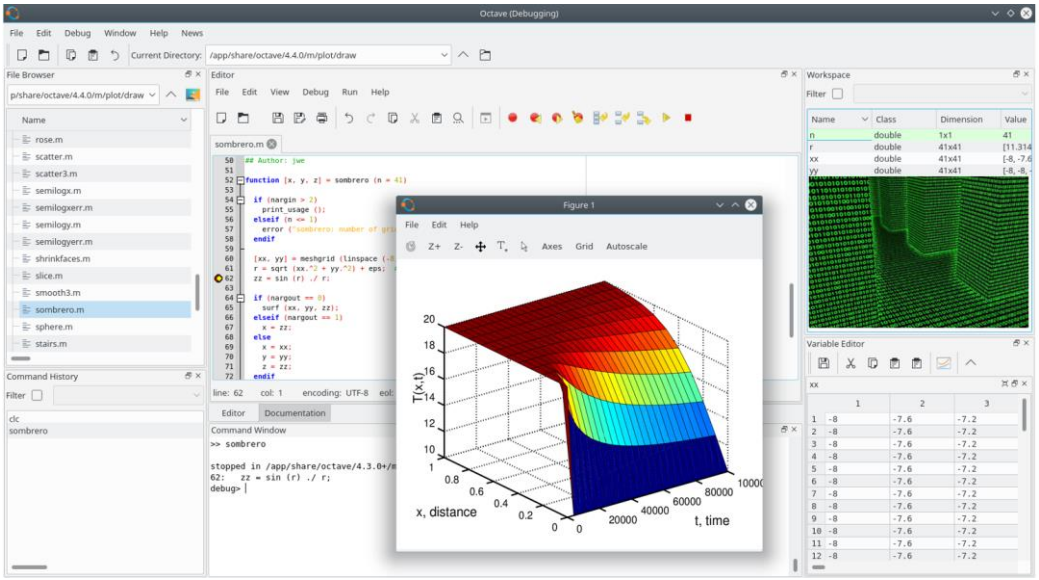

Figure:

GUI mode of free GNU Octave (compatible with Matlab), a high-level interpreted scientific programing language, intended for user friendly numerical computations.

221.007 Erdwissenschaftlicher Workshop

01.04. & 02.04.2019

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"Geopolymere - anorganische Bindemittelmaterialien: innovative Anwendungen"

Inhalt der LV:

Der Kurs befasst sich mit inorganischen Geopolymeren, deren Chemie, Zusammensetzung, Eigenschaften (physikalisch und chemisch) und Applikationsmöglichkeiten in der Bauwirtschaft.

Dabei liegt der Schwerpunkt auf materialwissenschaftlichen Aspekten, wie z.B. Unterschiede in der Bindemittelzusammensetzung und Mikrostruktur und deren Auswirkungen auf die resultierenden Materialeigenschaften in Bezug auf (bio-) chemische Beständigkeit und Hitzebeständigkeit.

Der Kurs kombiniert dabei Theorieeinheiten mit praktischen Laborübungen (Geopolymer Herstellung).

Ziele:

Studierende besitzen nach Beendigung der LV:

- Erhöhtes Grundlagenverständnis in Bezug auf die physio-chemischen Materialeigenschaften von inorganischen Geopolymeren, sowie
- deren Applikationsmöglichkeiten in der Bauwirtschaft
- Praxis Erfahrungen in Bezug auf Geopolymer Herstellung

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"Geopolymers - inorganic binder materials: innovative applications"

English course description:

The course provides in-depth lecturing on the chemistry, compositions, properties, and innovative applications of geopolymers in comparison to conventional binders, such as Portland and Calcium aluminate cements.

Emphasis is given on a materials science approach by relating differences in binders composition and microstructure on resulting properties, including (bio-)chemical and heat resistance performance. Lectures are complemented with practical demonstration sessions in laboratory (Geopolymer production).

Aims:

- Understanding physio-chemical material properties of inorganic geopolymers, and
- their application possibilities in the construction industry.
- Practical lab experience with regard to geopolymer production.

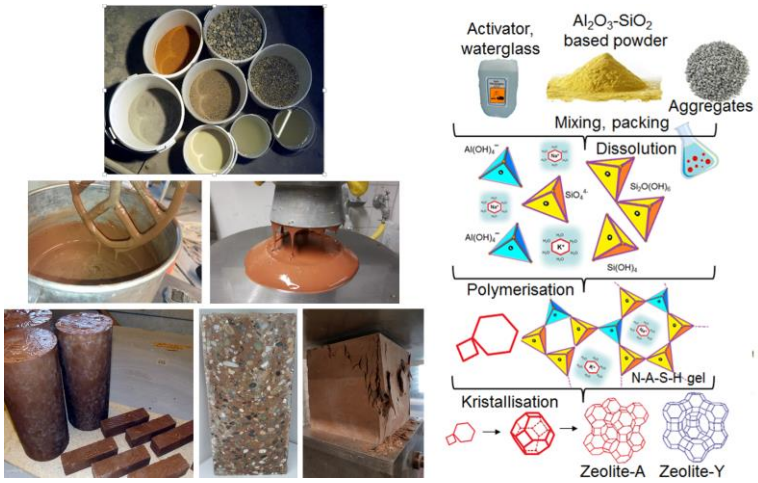

Figure:

Geopolymer mortar specimen production; mixing of two component (liquid and powder) geopolymer binder with aggregates; workability and strength tests (left photos). Polycondensation reaction mechanism of geopolymerisation (right schematic diagram).