Lecture 0: Introduction

BE0B17MTB – Matlab

Miloslav Čapek, Viktor Adler, Michal Mašek, and Vít Losenický

Department of Electromagnetic Field
Czech Technical University in Prague
Czech Republic
matlab@elmag.org

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Outline

1. What is MATLAB?
2. Why to Learn MATLAB?
3. Launching and Termination
What is Matlab?

Matlab is...

▶ High-level programming language (*4th generation language*).
▶ Interpreted language (not compiled, but... JIT).
  ▶ Intended mainly for numerical computing (nevertheless includes MuPAD symbolic kernel).
▶ Philosophy: kernel + tool boxes + user-defined functions → wide application.
  ▶ Wide possibilities of linking with other tools (Java, C++, Fortran, Python, .NET, Excel, physical- / multi-physical softwares).
▶ Speed (of well written) algorithm comes near to that of C++.
▶ Excellent “for fast prototyping.”
  ▶ Matlab does not require variables declaration (not always the advantage).
▶ Multi-licensed for CTU.
  ▶ Available for students as well!

▶ CTU students: download.cvut.cz
▶ FEE students: svti.fel.cvut.cz/cz/services/software/matlab.html
MATLAB’s Potential

Why to learn MATLAB?

- MATLAB is a worldwide standard.
- It is used by more than 5000 universities worldwide.
- Licenses used by thousands of corporations in aviation, biotechnology, electronics, cybernetics, mechanical engineering, finance, ...
- Knowledge of MATLAB can be used in other courses at the University as well as in professional life.
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## Where to make use of MATLAB?

- Data processing and visualization during laboratory exercises.
- When elaborating diploma works.
- Seminar exercises (signals, algorithm development, ...).
- Theory verification (mathematics and physics classes, electromagnetic field, electronic circuits, ...).
- Studying aboard (Erasmus, Sokrates).
- “everywhere” :)

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**MATLAB’s Potential**
Historical Development of MATLAB

▶ the 1970’s
  ▶ Cleve Moler\(^1\), MATLAB used instead of Fortran.
  ▶ MATrix LABoratory $\rightarrow$ matrix is the basic data structure.
  ▶ Fortran-based syntax.
▶ 1983
  ▶ Jack Little rewrote Matlab in C.
  ▶ New functionality and new mathematical libraries added.
▶ 1984 (MATLAB is so far for free!)
  ▶ MathWorks founded in 1984
▶ 2004
  ▶ Matlab used by more than 1 million of active users.
▶ now...
  ▶ R2019b is the newest version of Matlab.
  ▶ local distribution: Humusoft s.r.o.

\(^1\)see: http://www.mathworks.com/company/aboutus/founders/cleemoler.html
Alternatives to MATLAB

**Fortran:** most of the libraries still in Fortran, used mostly by physicists

**Python:** for free, fast and intuitive; Spyder provides MATLAB-like features

**Mathematica:** symbolic and numerical calculations, excellent symbolic kernel, extensive applicability, mostly for mathematicians and physicists

**Maple:** symbolic and numerical calculations

**MathCad:** used for symbolic and numerical calculations, slightly out-of-date

**Octave:** for free, syntax and functionality similar to Matlab, not so extensive, smartphone executable

**R:** for free, designed particularly for statistical applications

**Scilab:** MATLAB-like, open documentation

**Derive:** small, fast, Casio calculator executable
Alternatives to MATLAB

- **MATLAB vs. C/C++**
  - Choice between the two strongly depends on application.
  - C/C++ faster in general, MATLAB, on the other hand, provides implicit parallelism.
  - General principle: MATLAB is more than suitable for everything except commercial compiled code (especially MATLAB 6.5 and above: JIT + Real-Time Type Analysis).

- **MATLAB vs. Fortran**
  - MATLAB has wider support, more intuitive syntax.
  - Speed of a well written code is (usually, at least) comparable.
  - Utilization of Fortran is on the decline.

- **MATLAB vs. Python**
  - MATLAB offers significant support thanks to MathWorks, Matlab File Exchange.
  - Python entirely for free, it’s becoming more and more popular.
Launching MATLAB

- **Desktop icon**

- **Command line:**
  - `matlab`

- MATLAB can be launched with a set of optional parameters.
  - `matlab -r "test(10)"`

- **System requirements** for MATLAB R2019a:
  - Windows 7+
  - 4 GB RAM
  - 3.1 GB of HDD (MATLAB only), 5-8 GB for a typical installation
  - Any Intel or AMD x86-64 processor

- Available also for Mac and Linux!

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² [https://www.mathworks.com/support/requirements/matlab-system-requirements.html](https://www.mathworks.com/support/requirements/matlab-system-requirements.html)
**MATLAB Termination**

- Close button in top right of MATLAB window.

- Possibility to terminate MATLAB in the command window.

  ```matlab
  >> quit % terminates Matlab (and all windows)
  >> exit % -//-
  ```

- More advanced options (see documentation).

  ```matlab
  >> quit cancel
  >> exit force
  ```
Questions?

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