KMU 255
Computer Programming

Hacettepe University
Department of Chemical Engineering
Fall Semester

Selis Önel, PhD

KMU255 Instructor

- Selis Önel, PhD
- Room: 14, 2nd floor
- E-mail: kmu255@gmail.com
  selis@hacettepe.edu.tr
- Web: http://yunus.hacettepe.edu.tr/~selis
- Office hours: Announced on office schedule

KMU255 Staff

- Java Specialist: Erhan Senlik

  Room: Computer Room

  E-mail: erhansnk@hacettepe.edu.tr
- Teaching Assistant: Gonca Sağlam

  E-mail: gonca.s@hacettepe.edu.tr

Who am I?

Post Doctoral Studies in Engineering in Medicine (Summer 2008-2011)
Specializing in Nonequilibrium Solidification during preservation of cells
Harvard Medical School and Massachusetts General Hospital
Boston, MA, USA

Ph.D. in Mechanical Engineering (2006)
Specializing in Mathematical Modeling in Materials Science and Engineering
Northeastern University, Boston, MA, USA
Advisor: Dr. Teiichi Ando

M.S. in Chemical Engineering (2000)
Specializing in Heat and Mass Transfer and Energy Optimization
Middle East Technical University, Ankara, Turkey
Advisor: Dr. Güniz Gürüz

B.S. in Chemical Engineering (1997)
Middle East Technical University, Ankara, Turkey

Lycee Diploma, Mathematics Section (1992)
American Collegiate Institute, İzmir, Turkey

My Research Background, MS

Macro Scale Thermodynamic Systems

Energy Optimization of the Yankee Hood Dryer

in collaboration with

İpek Kağıt A.Ş., Yalova

and

Pulp and Paper Foundation of Turkey

Master's Thesis Advisor: Dr. Güniz Gürüz, Professor

Department of Chemical Engineering
Middle East Technical University, Ankara, Turkey

Mathematical Modeling of the Thermal Drying System

Yankee Speed 1250-1650 m/min

Production 2.5-3.6 ton/h

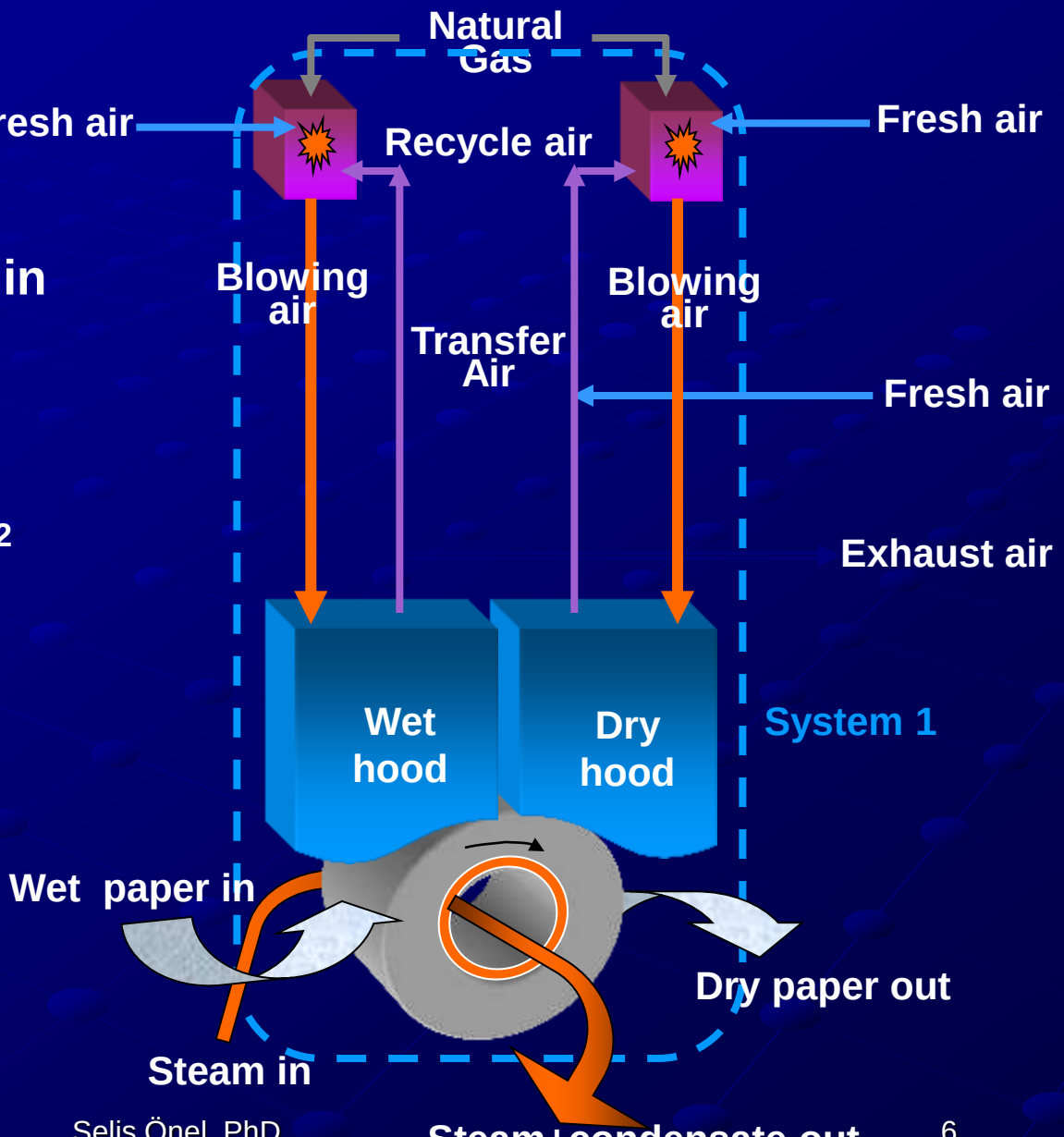
Paper width 2.7 m

Paper basis weight 15-20 g/m²

Paper moisture content at

Yankee entrance 60 %

Yankee exit 4-7 %



My Research Background, PhD

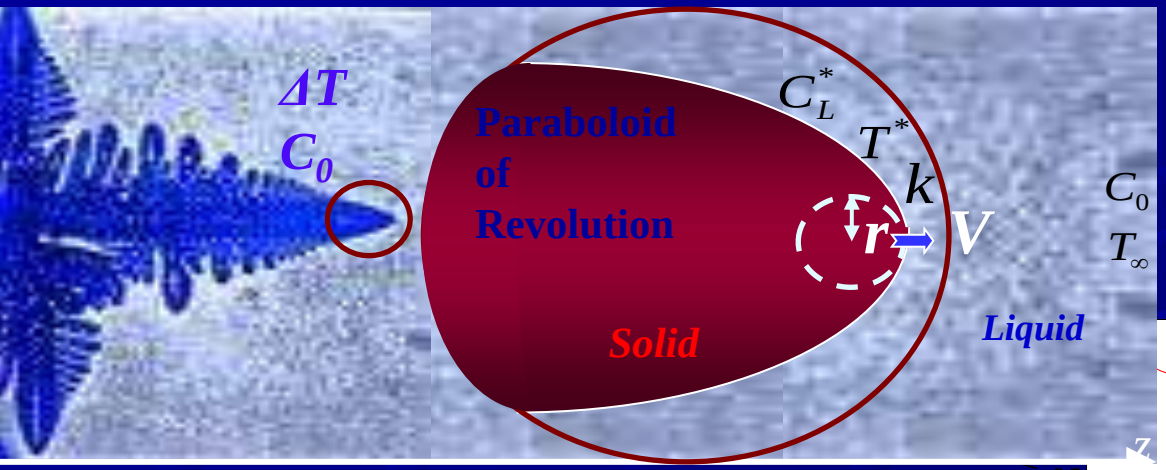
Nano Scale Thermodynamic Systems

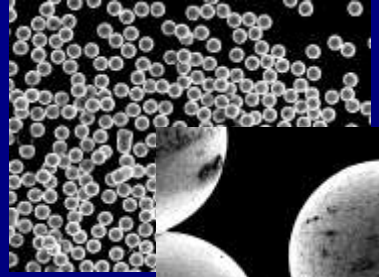
Comparison and Extension of Free Dendritic Growth Models through Application to Ag-15%Cu Alloy

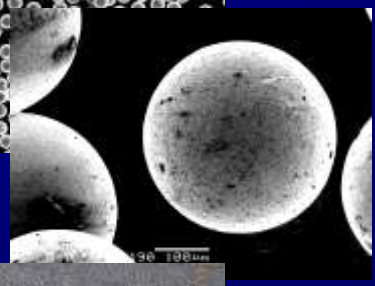
PhD Thesis Advisor: Dr. Teiichi Ando, Professor

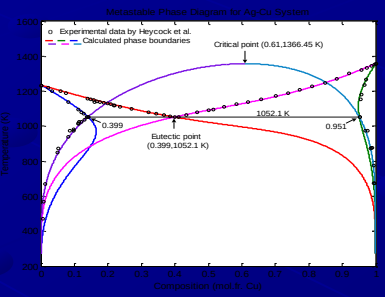
Advanced Materials Processing Lab (AMPL)
Department of Mechanical and Industrial Engineering
Northeastern University, Boston, MA, USA

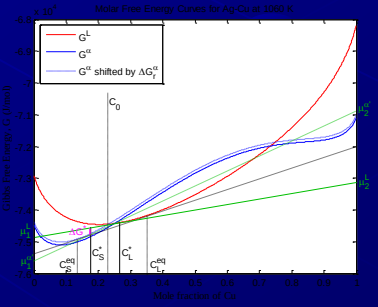
Mathematical Modeling of Crystal Growth

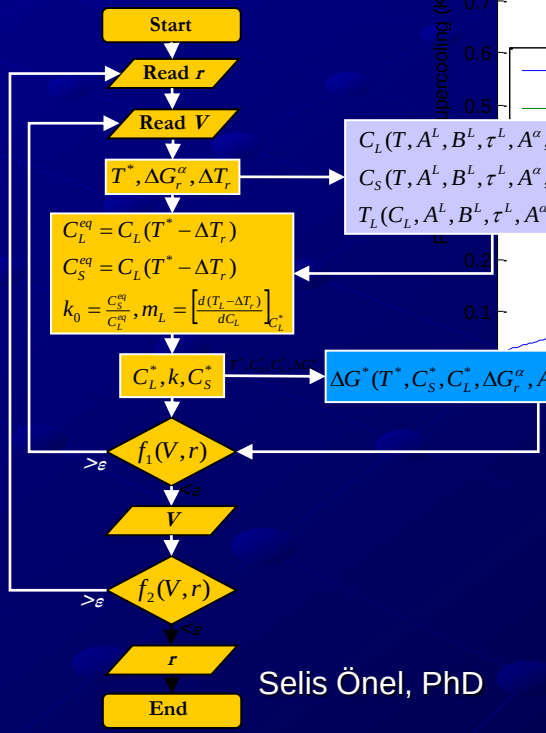


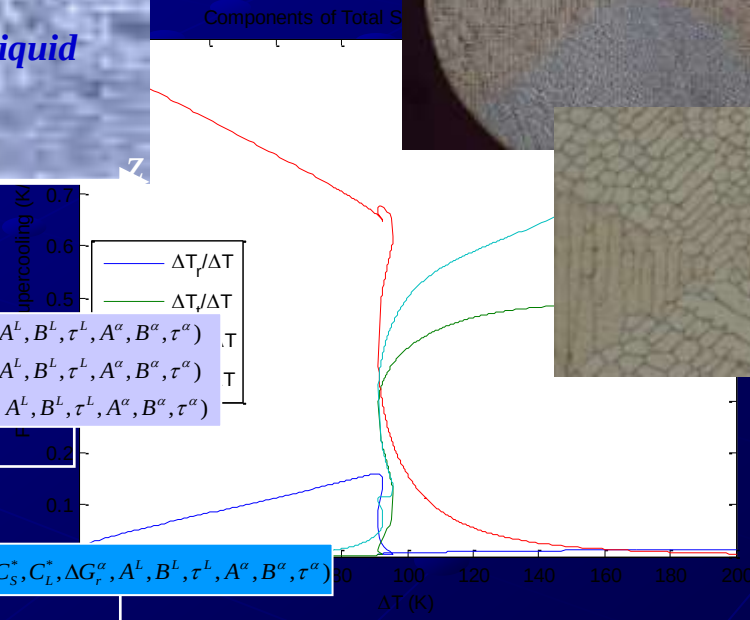


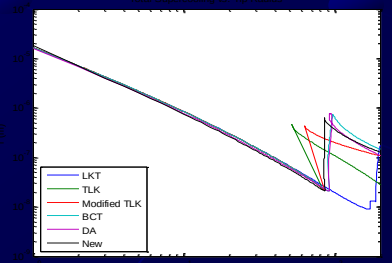








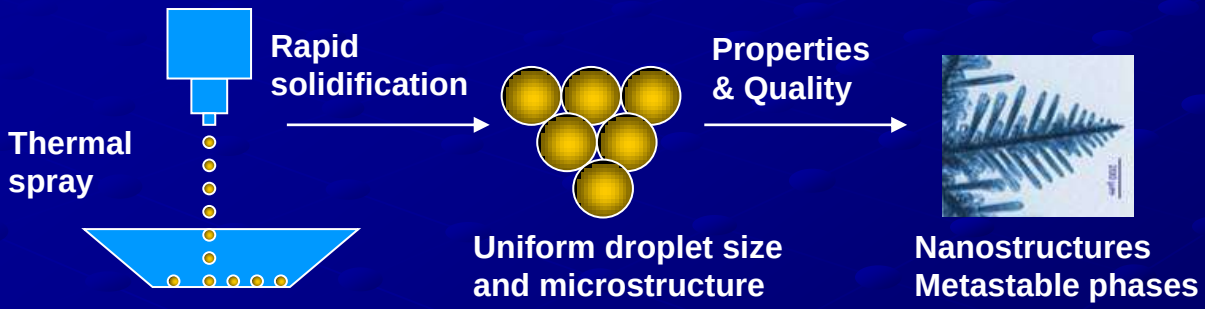




Rapid Solidification Problems

Advanced materials: a**utomotive, aerospace, semiconductor, electronic** industries

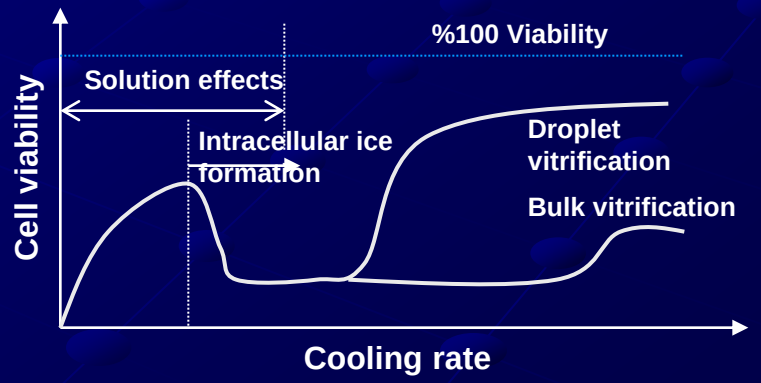
Purpose → Controlling the nano-structures of advanced materials that form during rapid solidification



Improves mechanical, chemical, thermal, electrical, magnetic, optical properties

Biomedicine: **“Cryobiology”!**

Purpose → Reducing the amount of poisonous cryoprotectants and formation of ice crystals detrimental to cells during the freezing/vitrification of cells for cryopreservation



KMU255 Course Goals

- Teach fundamentals of computer programming with application to:
  - Java
  - Matlab
- Enhance students' programming skills to implement algorithms
- Teach the use of MATLAB as a tool (using built-in functions) for solving problems in science and engineering

In my time there were …

- Hardly any PC's in the department
- Long lines for the public PC's in the dorms
- Slower processors and smaller memories
- No memory sticks
- Really slow inkjet printers

So take advantage of the high technology

My Expectations from You

- Attend classes and pay attention
- Do homework !

  (Group study is allowed as long as you submit your own work)
- Read books on programming and apply examples on the computer
- Get familiar with MATLAB®
- Turn homework in on time
- Avoid plagiarism and copying!

Plagiarism ??

- ***transitive verb*** → to steal and pass off (the ideas or words of another) as one's own **:** use (another's production) without crediting the source
- ***intransitive verb*** → to commit literary theft **:** present as new and original an idea or product derived from an existing source

Reference:

http://www.merriam-webster.com/dictionary/plagiarizing

Useful Textbooks

- Kenneth C. Louden and Kenneth A. Lambert, Programming Languages: Principles and Practices, 3rd Edition. Course Technology, Cengage Learning, 2012, ISBN-13 978-1-111-52941-3
- Daniel Kaplan, Introduction to Scientific Computation and Programming, 1st Edition, Cengage Learning, 2004, ISBN-10: 0534389139 ISBN-13: 9780534389130
- Attaway, MATLAB: A Practical Introduction to Programming and Problem Solving, Elsevier Science, 2009
- C. Moler, Numerical Computing with MATLAB®, Electronic edition: The MathWorks, Inc., Natick, MA, 2004, http://www.mathworks.com/moler. Print edition: SIAM, Philadelphia, 2004.http://ec-securehost.com/SIAM/ot87.html
- If you have access to a computer at home, you are recommended to obtain a copy of MATLAB (student edition will be enough) for Windows:
  - MATLAB & Simulink Student Version Release 14, ISBN 0-9755787-2-3
  - MATLAB Student Version Release 13, ISBN 0-9672195-9-0

Grade Percentages

Quizes	15%
Homeworks	15%
Midterm I	15%
Midterm II	15%
Final (Class exam+Project)	40%
Total	100%

Homeworks

1. Problems to be solved by hand
   - Improve understanding of flowcharts
   - Carry out few steps of scripts by hand
2. Problems to be programmed in MATLAB®
   - Improve programming skills
   - Learn MATLAB® toolboxes
3. Problems in math, science and engineering and mathematical modeling
   - Identify engineering problems that need to be solved by computer programming

Midterms

- Midterm I : 4th week of classes
- Midterm II: 8th week of classes
- Final exam: 13th week of classes

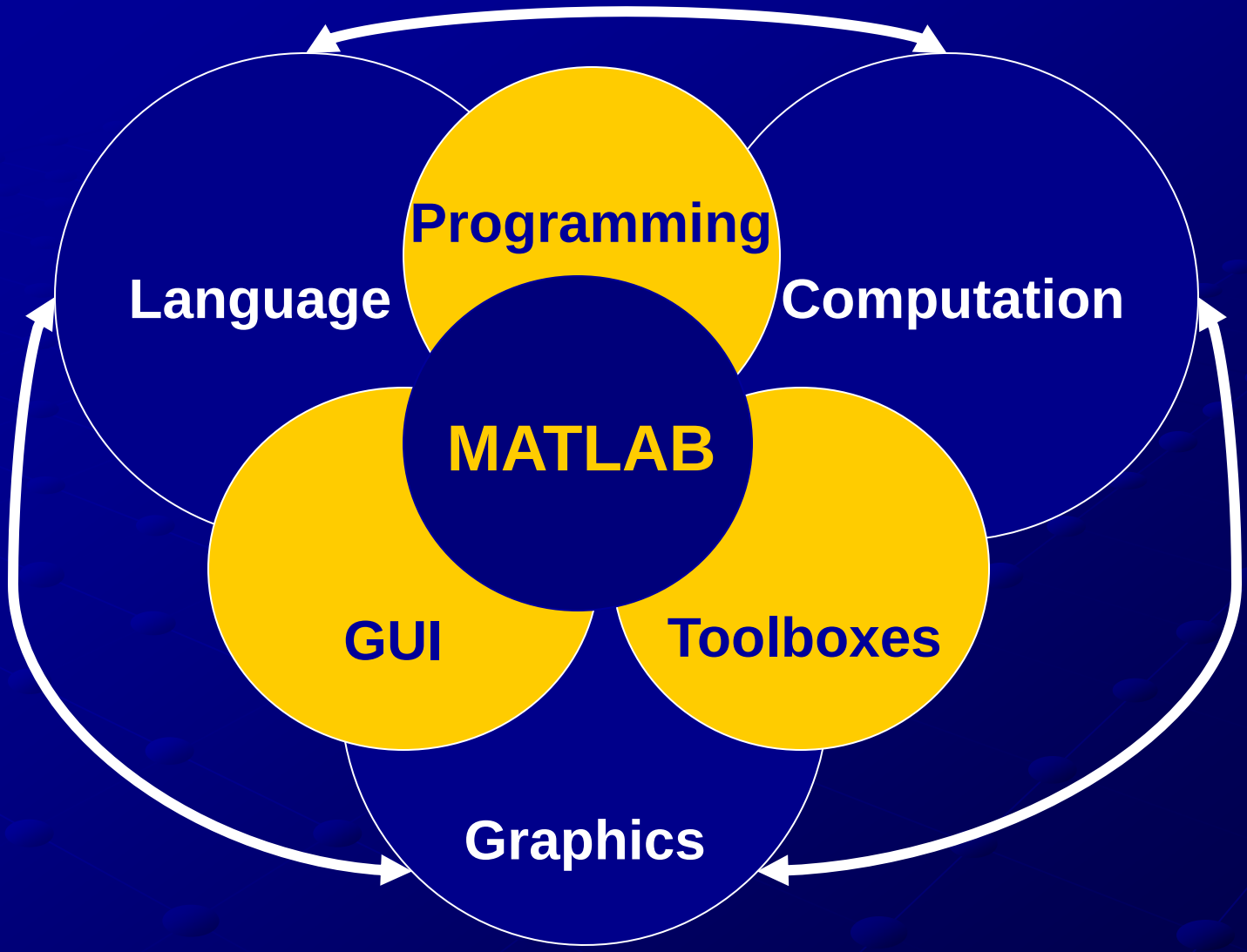
- Midterm questions may be reviewed in an additional tutorial hour if requested

What are your expectations?

Please write in a paragraph or list

1. Programming languages you are familiar with
2. Your familiarity with MATLAB®
3. Your expectations from this course, the instructors and the assistant
4. How you think this course will help you in your education and career

MATLAB Feautures



Reproduced from: S. Lyshevski, Engineering and Scientific Computations Using Matlab, 2003, p.2

MATLAB is …

- A high level computer language
- For scientific computing and data visualization
- Built around an interactive programming environment

Where MATLAB programs

- Can be tested and debugged quickly
- Do not need to be compiled, linked and executed after each correction
- Can be developed much faster than FORTRAN, C or Java programs

BUT

- You need to have MATLAB installed on your computer

MATLAB® …

- is the short for "**mat**rix **lab**oratory“
- was designed by Cleve Moler in late 1970s to give his students access to LINPACK and EISPACK without having to learn Fortran
- (C. Moler: chairman of the computer science dept. at the Univ. of New Mexico at that time, now chairman at The Mathworks)
- was enjoyed by the applied mathematics community
- was rewritten by Cleve Moler, Steve Bangert, and Jack Little in C and set the foundation for The MathWorks in 1984
  (rewritten libraries were known as JACKPAC)

MATLAB® …

- was first adopted by control design engineers, Little's specialty, but quickly spread to different fields
- is also used in education (linear algebra and numerical analysis) and is popular amongst scientists involved with image processing
- offers toolboxes for solving mathematical problems in many popular fields

Links for Information on MATLAB

- http://www.mathworks.com/products/matlab/
- http://www.cyclismo.org/tutorial/matlab/
- http://kgptech.blogspot.com/2005/07/matlab.html
- http://www.mathworks.com/matlabcentral/