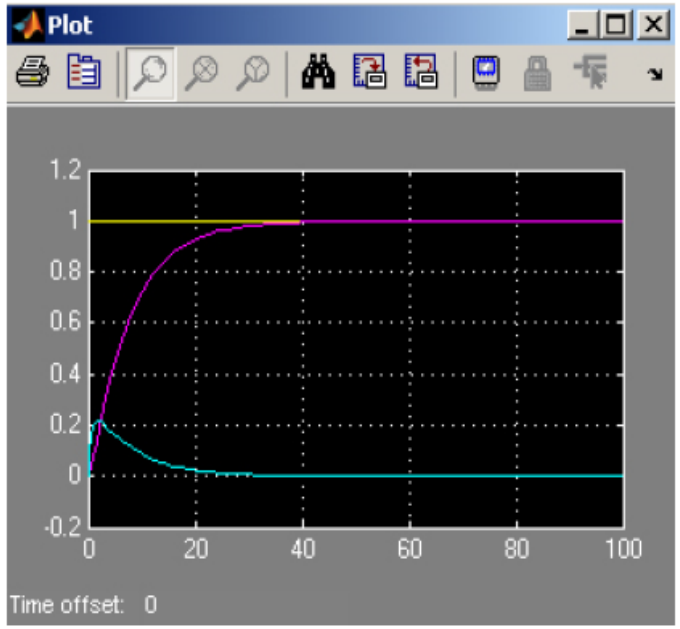
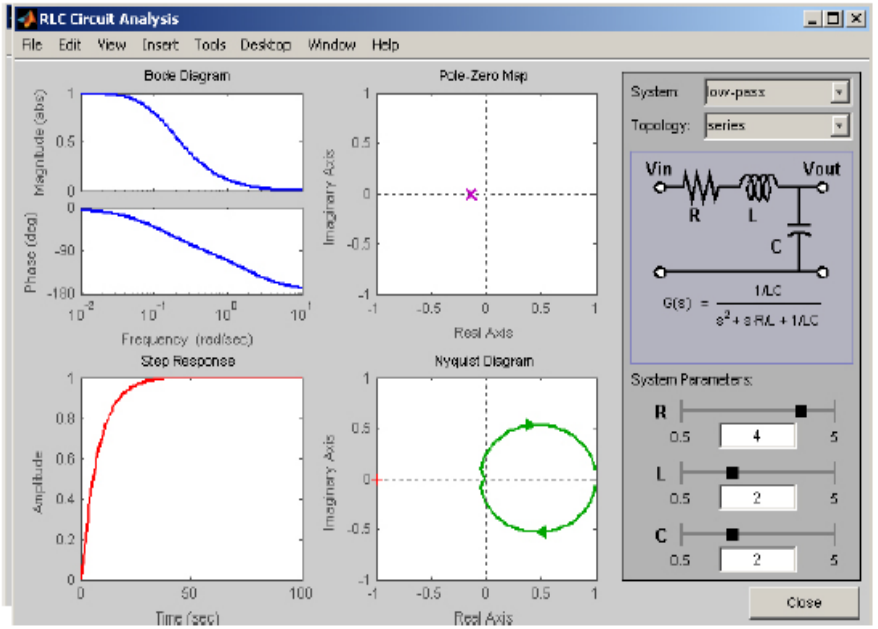
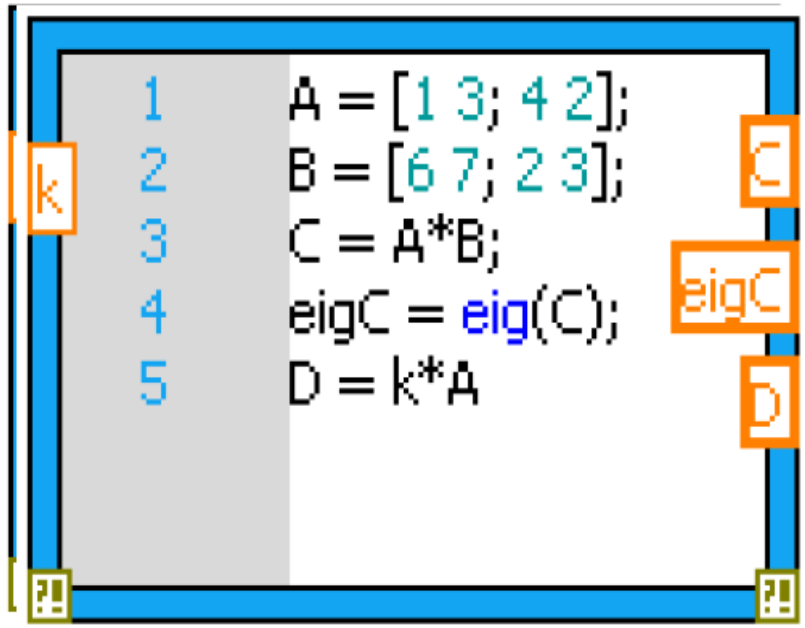
UNIVERSITY POLITEHNICA TIMIŞOARA
FACULTY OF ELECTRONICS, TELECOMMUNICATIONS AND INFORMATION TECHNOLOGIES
B-dul V. Pârvan, Nr. 2, 300223, TIMIŞOARA, ROMANIA
tel/fax: +40-(0)256-403291/5, e-mail: decanat.etc@upt.ro, http://www.etc.upt.ro

Electronic circuits computer assisted analysis

(the former Modeling and Simulation lecture)







Coordinators: **Raul Ionel** (raul.ionel@upt.ro) & **Anca Dărăbuț** (anca.darabut@upt.ro)

Electronic circuits computer assisted analysis

Summary

- The “Electronic circuits computer assisted analysis” lecture (the former “Modeling and Simulation” lecture) focuses on equipping students with the skills to use software tools such as MATLAB, Simulink and TI Tina, to analyze and understand the behavior of simple electronic circuits.
- Through this course, students learn to create programs, models and schematics used to simulate the performances and dynamics of electronic circuits. This approach provides a deeper comprehension of theoretical concepts such as Mathematical Models, State Space Models, Transfer Functions, Bode plots, Step response, Impulse response etc.
- Basically, by means of computer aided analysis, we aim to obtain a collection of code resources providing practical examples and helping the students enhance their problem-solving abilities, while preparing them for advanced master studies in electronics and related fields.

Form of evaluation – Exam, contribution during lectures, laboratory tests, laboratory work, 4 credits.

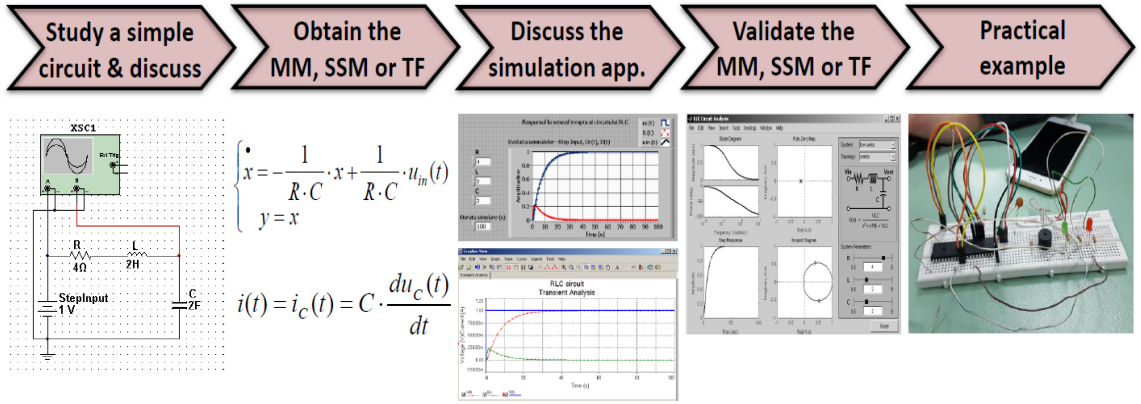
Electronic circuits computer assisted analysis
Resources (selection)

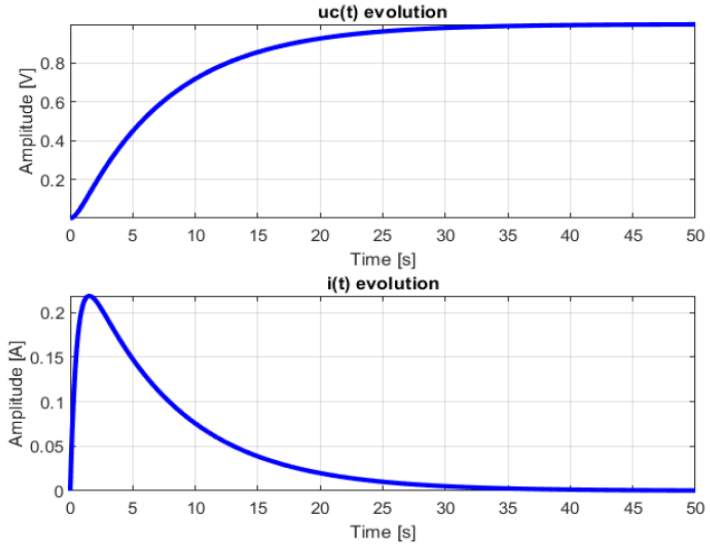
Materials list:

[1] S. Gibilisco (Editor), The Illustrated Dictionary of Electronics 8th Ed., McGraw-Hill, USA, 2001.
[2] NI Documentation, Control Design and Simulation Module, 2009.
[3] R. Ionel, Modelare și Simulare. Experimente și Aplicații, Ed. Politehnica, Timișoara, ISBN 978-606-554-315-7, 2011.
[4] M. Lascu, R. Ionel, Programare Grafică, Ed. Politehnica, Timișoara, ISBN 978-606-554-908-1, 2015.
[5] J. O. Attia, Electronics and Circuit Analysis using MATLAB, CRC Press, ISBN 0-8493-1176-4, 1999.
[6] F.L. Severance, System Modeling and Simulation: An Introduction, Wiley, ISBN: 978-0471496946, 2001.
[7] B.P. Zeigler, H. Praehofer, T.G. Kim, Theory of modeling and simulation: integrating discrete event and continuous complex dynamic systems, Amsterdam Academic Press, 2000.

Software:

TI Tina, MATLAB & Simulink.

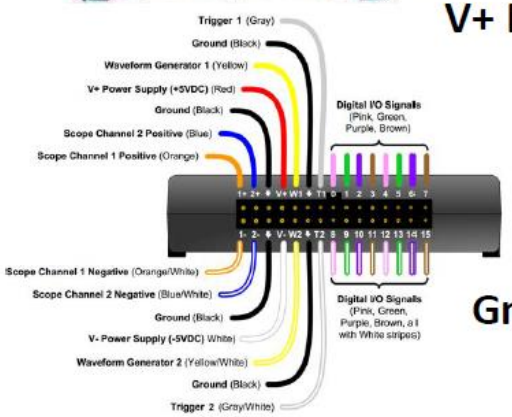


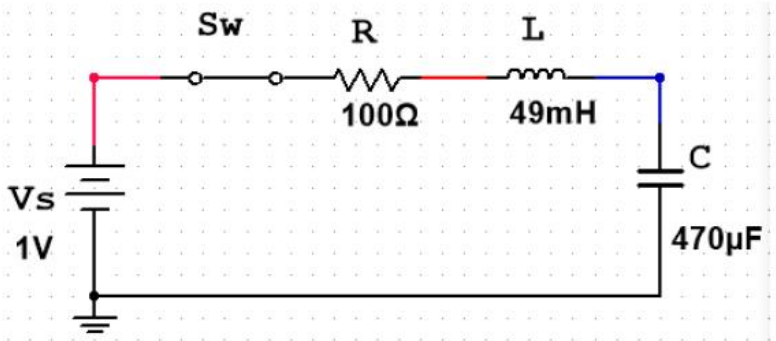


Electronic circuits computer assisted analysis

Application example

PRACTICAL APPLICATION





State Space Model - SSM

$$\begin{cases} \begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -R/L & -1/L \\ 1/C & 0 \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 1/L \\ 0 \end{bmatrix} \cdot u_{in}(t) \\ y = \begin{bmatrix} 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + [0] \cdot u_{in}(t) \end{cases}$$

Series RLC circuit

SIMULATION VS REAL CIRCUIT

For extended information, please send your inquiry to **raul.ionel@upt.ro/anca.darabut@upt.ro**, message subject **Optional Topic 9 info**.