

Lab 7: AC Response of a first Order RC Circuit

Theory and Introduction

Consider Lab 7. We present the figure of a circuit that represents an RC system (see the circuit provided figure).

Where:

1. Response of a first order RC system (see the circuit figure)

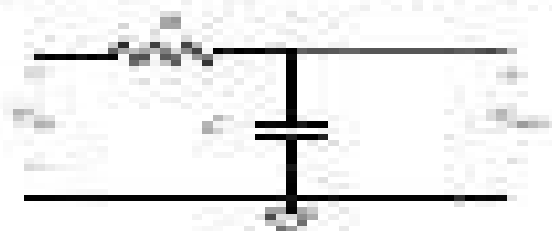


Figure 1: RC circuit diagram

The input-output relationship for the first-order RC system (see Fig. 1) is given by the state-space differential equation:

$$\frac{dv_{out}(t)}{dt} + \frac{1}{RC}v_{out}(t) = \frac{1}{RC}v_{in}(t)$$

assuming that $v_{out}(0)$ is a constant (the steady-state).

$$v_{out}(t) = v_{out}(0) + \Delta v(t)$$

the output will be a constant (the steady-state) plus an exponentially-decaying phase shift, according to:

$$v_{out}(t) = \frac{1}{RC} \exp(-t/RC) + v_{out}(0)$$

Lab 7 Transient Response Of A 1 Order Rc Circuit

**United States. Air Force. Office of
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Introduction to Electric Circuits Richard C. Dorf, James A. Svoboda, 2010-01-07 The central theme of Introduction to Electric Circuits is the concept that electric circuits are a part of the basic fabric of modern technology. Given this theme, this book endeavors to show how the analysis and design of electric circuits are inseparably intertwined with the ability of the engineer to design complex electronic communication, computer, and control systems as well as consumer products. This book is designed for a one to three term course in electric circuits or linear circuit analysis and is structured for maximum flexibility.

Practical Electrical Engineering Sergey N. Makarov, Reinhold Ludwig, Stephen J. Bitar, 2016-06-27 This textbook provides comprehensive in-depth coverage of the fundamental concepts of electrical engineering. It is written from an engineering perspective with special emphasis on circuit functionality and applications. Reliance on higher-level mathematics and physics or theoretical proofs has been intentionally limited in order to prioritize the practical aspects of electrical engineering. This text is therefore suitable for a number of introductory circuit courses for other majors such as mechanical, biomedical, aerospace, civil, architecture, petroleum, and industrial engineering. The authors' primary goal is to teach the aspiring engineering student all fundamental tools needed to understand, analyze, and design a wide range of practical circuits and systems. Their secondary goal is to provide a comprehensive reference for both major and non-major students as well as practicing engineers.

AFOSR. United States. Air Force. Office of Scientific Research, 1950. *Analysis of Required Core Courses of Electronic Engineering by Graduates, Teachers, and Electronics Industry at Sze Hai Junior College of Technology and Commerce in Taiwan*. Chin-Chang Hsieh, 1996. **NRL Report**, 1953. *Technical Abstract Bulletin*, 1978. Title Announcement Bulletin, 1957. **MINNIE and HSpice for Analogue Circuit Simulation** D. C.

Barker, 2012-12-06 After many years of teaching circuit theory and analogue electronic circuits, the author believes that for most students the main path to obtaining a good understanding of the principles involved as measured by their ability to apply them in a correct and intelligent manner is through problem solving and design exercises. In an ideal world, the student would be able to construct the circuit being analysed or designed and so directly test the calculated or predicted results. Indeed, experience leads to the conclusion that typical students like to see their own circuits perform as intended with a consequent increase in motivation. At present, however, time and facility constraints mean that most of this work is of the pencil and paper variety, students having few opportunities to see the consequences of their efforts in a practical situation. At best, they have to accept sample solutions or simply numerical answers. This path can seem tedious to all but the most motivated of students, so an alternative which can provide many of the benefits of direct circuit testing within the time and resources available is of immediate interest. This is where the MINNIE and HSpice simulation package can assist the undergraduate teaching activity.

Modeling Power Electronics and Interfacing Energy Conversion Systems M. Godoy Simoes, Felix A. Farret, 2016-09-16 Discusses the application of mathematical and engineering tools for modeling simulation and control.

oriented for energy systems power electronics and renewable energy This book builds on the background knowledge of electrical circuits control of dc dc converters and inverters energy conversion and power electronics The book shows readers how to apply computational methods for multi domain simulation of energy systems and power electronics engineering problems Each chapter has a brief introduction on the theoretical background a description of the problems to be solved and objectives to be achieved Block diagrams electrical circuits mathematical analysis or computer code are covered Each chapter concludes with discussions on what should be learned suggestions for further studies and even some experimental work Discusses the mathematical formulation of system equations for energy systems and power electronics aiming state space and circuit oriented simulations Studies the interactions between MATLAB and Simulink models and functions with real world implementation using microprocessors and microcontrollers Presents numerical integration techniques transfer function modeling harmonic analysis and power quality performance assessment Examines existing software such as MATLAB Simulink Power Systems Toolbox and PSIM to simulate power electronic circuits including the use of renewable energy sources such as wind and solar sources The simulation files are available for readers who register with the Google Group power electronics interfacing energy conversion systems googlegroups com After your registration you will receive information in how to access the simulation files the Google Group can also be used to communicate with other registered readers of this book

Air Force Scientific Research Bibliography: 1950-56 Library of Congress. Science and Technology Division,1961 Energy Research Abstracts ,1990 **Transactions of the I.R.E. Professional Group on Circuit Theory** ,1952 **Scientific and Technical Aerospace Reports** ,1994 *Nuclear Science Abstracts* ,1975-06 *Air Force Scientific Research Bibliography* ,1961 Basic Techniques in Electronic Instrumentation A. James Diefenderfer,1972 The Proceedings of the Institution of Electrical Engineers ,1957 **NBS Special Publication** ,1918 *Journal of the Communications Research Laboratory* ,1996 CoED ,1991

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