

RC Circuit Step Response MATLAB GUI Documentation

INTRODUCTION

The RC Circuit Step Response GUI was designed to help a student better understand the response of a first order system to a step function input. This GUI allows the user to vary the resistance and capacitance of a RC circuit, which is a first order system, and view the resulting time response due to a unit step input.

This document contains instruction on the usage of the GUI. Other documents are available on the topic of RC circuit responses.

FILES NEEDED TO RUN STEP RESPONSE GUI

rc_circuit_step.fig
rc_circuit_step.p
RC.jpg

Place these three files in the same folder, and make this the working directory in MATLAB.

RUNNING THE RC CIRCUIT STEP RESPONSE GUI

With the proper working directory selected, type 'rc_circuit_step' in the MATLAB command window to launch the GUI.

Fig. 1 shows the appearance of the GUI when it is first opened. There are initial values selected for the resistance (kOhm) and capacitance (uFarad). Each of these values can be changed by typing a value in the text box, or using the slider bar.

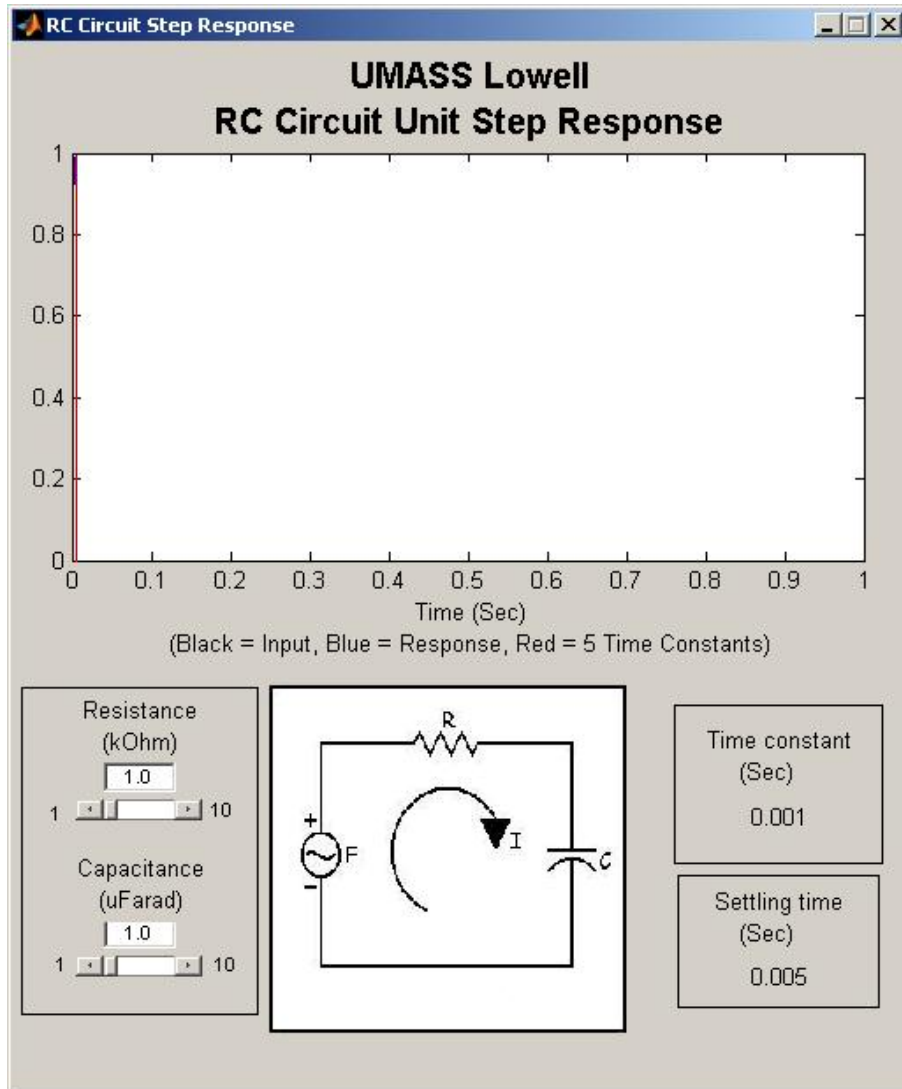


Fig. 1. RC Circuit Step Response GUI

Fig. 2 shows the controls used to change the resistance and the capacitance of the RC circuit, as well as the allowable values for these properties.

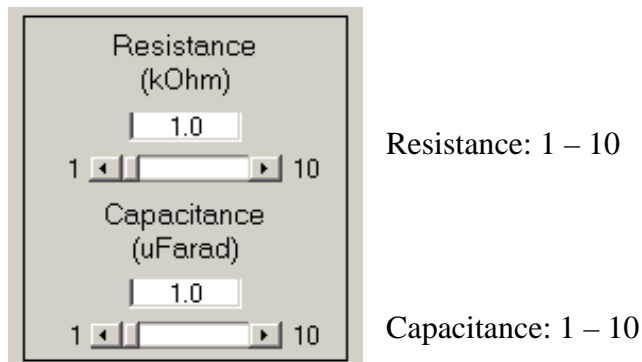


Fig. 2. Allowable input values for resistance and capacitance.

With the given resistance and capacitance, the time response due to a unit step input is plotted over a six second time span. The red line indicates the five time constant point in the response. Listed in the field to the right of the RC circuit illustration are the time constant and settling time for the system, as shown in Fig. 3.

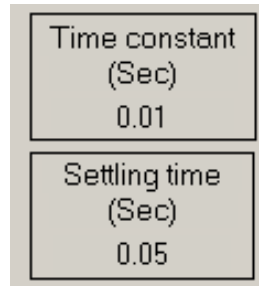


Fig. 3. Values calculated by GUI.