Bininstrumentation Assignment 1 Answer Version 3

Kevin Lin

03/26/2020

Problem 1

Definitions of below items:

Measurand:
While measuring the quantity of an object, the quantity is used to symbolize the value. The object is referred to measurand. A particular object ,it's physically value is being measured by transducer and be quantified. This process is called measurant. It includes desired input and object of measurement.

Direct operational mode:
It can directly communicate through terminal.

Invasive and non-invasive:
Non-Invasive sensors is device that do not require biofluids by take samples from human body. Optical transducer is one of them. In opposite, invasive sensor require input of sample. Non-invasive is getting popular in detecting of blood sugar since it does not require blood sample.

Generating mode:
In this mode, induction motor runs faster than synchronous speed of the motor. It occurs when the rotor is connected to a primer mover. The motor works as an induction generator.

Breaking mode refers to actual speed of motor is more than synchronous speed of the motor

Real-time measurements:
It's the value of intentianlly measured object at time of measurement.

Interfering input:
It's a built-in unsensitive parameter that is unintentionally as instrument needs.

Correlation coefficient:
It's a value that represents how two variables are related to each other. For instance, one variable(x1) has value of a set of value (1, 2 ,3 4) and the other variable has value of (2,4,6,8). It can be concluded that these two variables are highly correlated as variable 2 just muliplication of variable 2.

Zero drift:
microvolt offset and nanovolt offset of instrument which will increase accuracy. It refers to small change of measurand.

problem 2:

refer to attached A1_answer.m

problem 3:

I have shown my calucation and simulation below. The plot does not look like band pass filter response and I don't know here I did wrong.

```
source_voltage = 2

f_L = 100

f_H = 600

R_1 = 1000

R_2 = 1000

gain_ratio_dB = 10

C_1 = (1/(f_H * 2 * 3.14 *R_1))*1000000

C_2 =  (1/(f_L * 2 * 3.14 *R_2))*1000000

gain_ratio_normal = 10^(gain_ratio_dB/20)

sprintf("First capacitance is %.2fuF",C_1)

## [1] "First capacitance is 0.27uF"

sprintf("Second capacitance is %.2fuF",C_2)

## [1] "Second capacitance is 1.59uF"

sprintf("output voltage divided by input voltage is %.3f",gain_ratio_normal)

## [1] "output voltage divided by input voltage is 3.162"
```
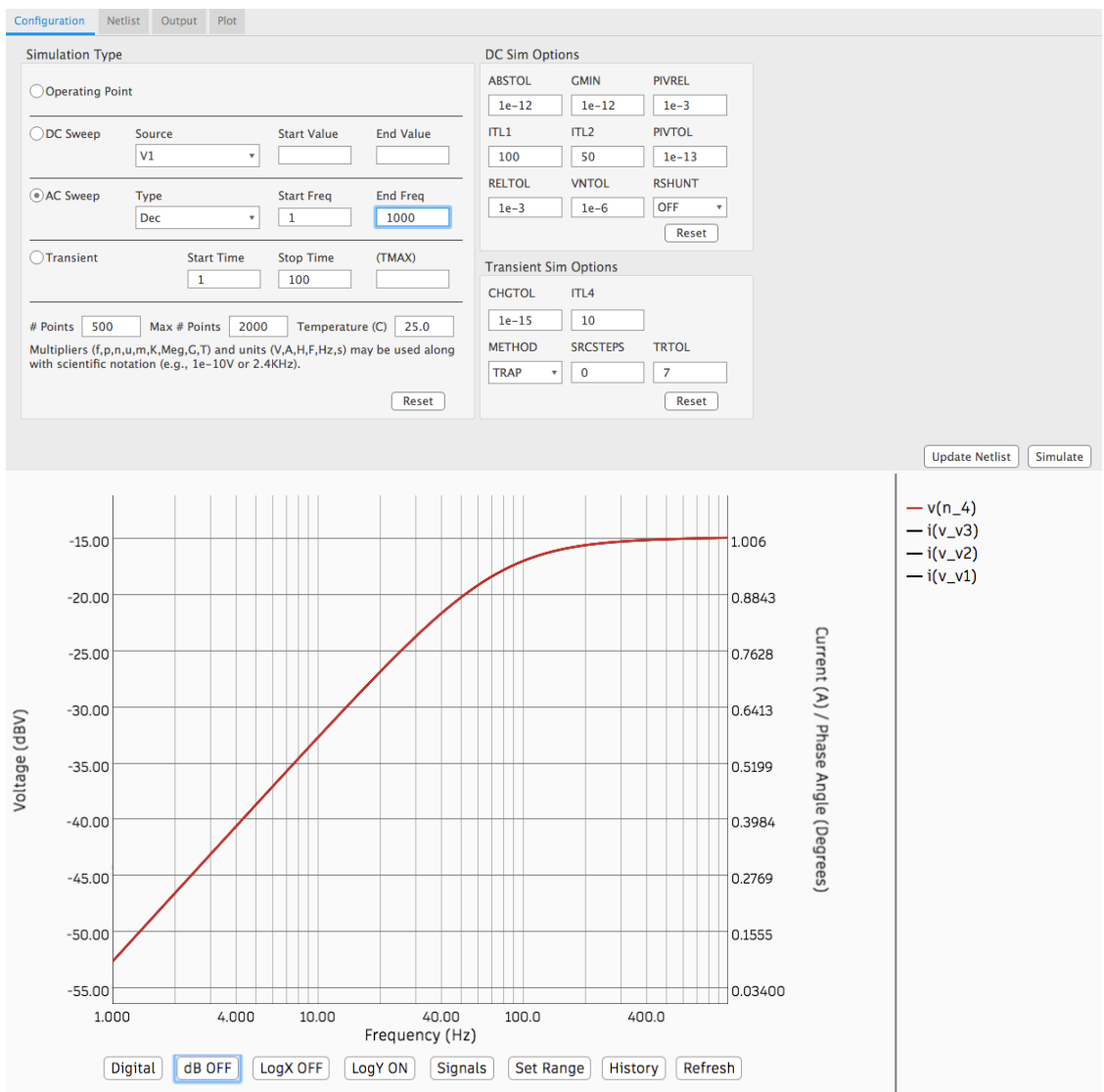
"Question 3 configuration using EAGLE"

"Question 3 configuration using EAGLE"