DESIGN OF HARTLEY OSCILLATOR FOR 10kHZ

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INTRODUCTION:

Hartley oscillator design uses two inductive coils in series with a parallel capacitor to form a resonant tank circuit and to generate sinusoidal oscillations. Feedback of the tank circuit is taken from the centertap of the inductor coil.This oscillator is also known as split inductance oscillator because the coil L is center-tapped.This oscillator circuit is said to be “series fed” because the DC collector current flows through the coil.

The frequency of oscillation is given by,

$$\boldsymbol{f = 1/(2 * \pi\sqrt{Leq * C})}$$

where,L_{eq}=L1+L2

The frequency of the oscillations can be adjusted by varying the value of capacitor C.

The Hartley oscillator is used to produce sine wave with the desired frequency,it is mainly used as radio receivers due to the wide range of frequencies. Thus the Hartley oscillator is designed for high frequencies by using small values of L_{eq} and C.

MODELING:

$$f = 1/(2 * \pi * \sqrt{Leq * C})$$

GIVEN:

BIASING RESISTOR VALUES

R1=380KΩ,

R2=72KΩ,

R3=1.2KΩ,

R4=4.8KΩ

TANK CIRCUIT DESIGN

f=10kHz

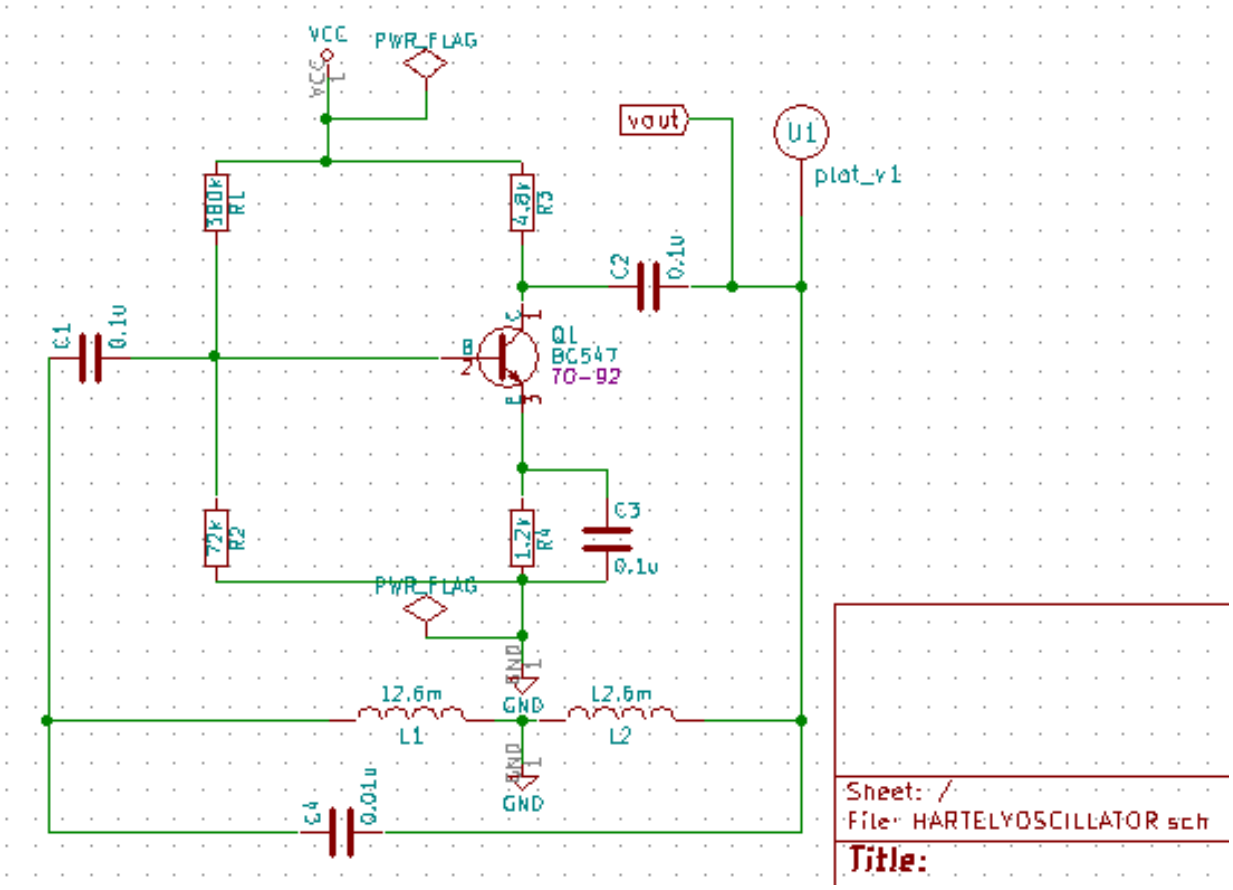
C1=C2=C3=0.1uF

C4=0.01uF

L_{eq}=25.3mH

L1=L2=12.66mH

RTL Schematic using esim Software:



ANALYSIS:

There are three types of response

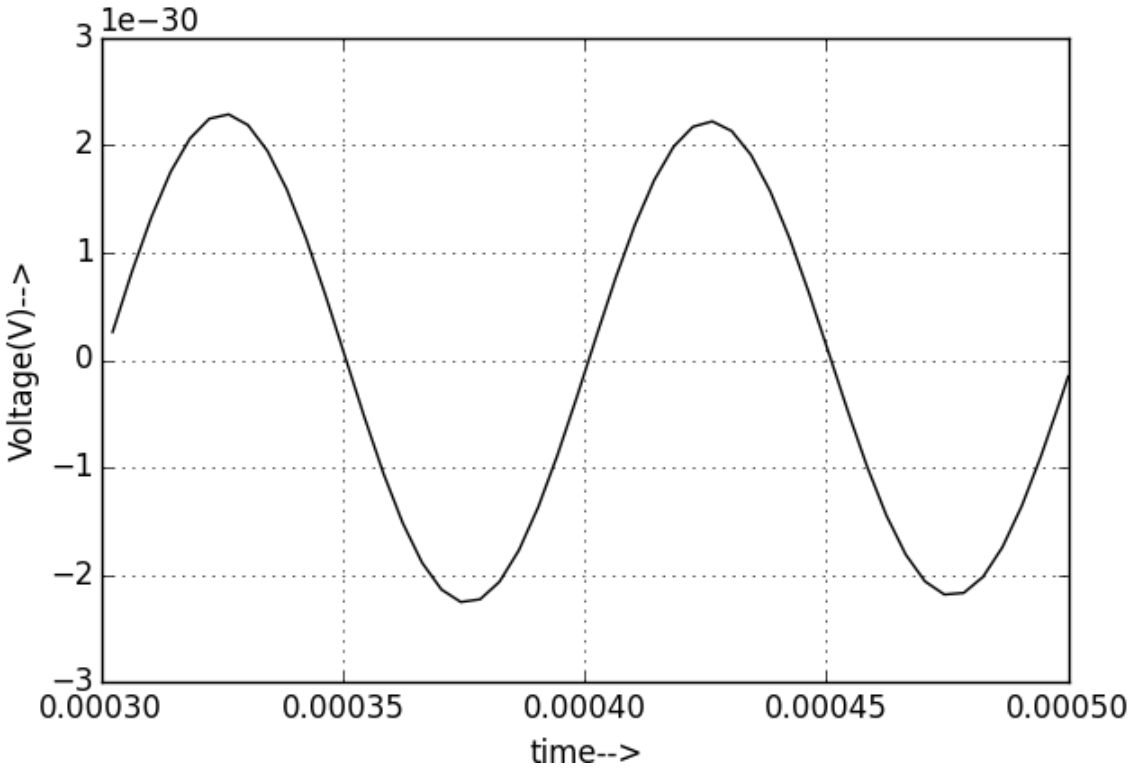
- AC
- DC
- Transient

DC analysis is to find the biasing voltages and currents at various points of the circuit

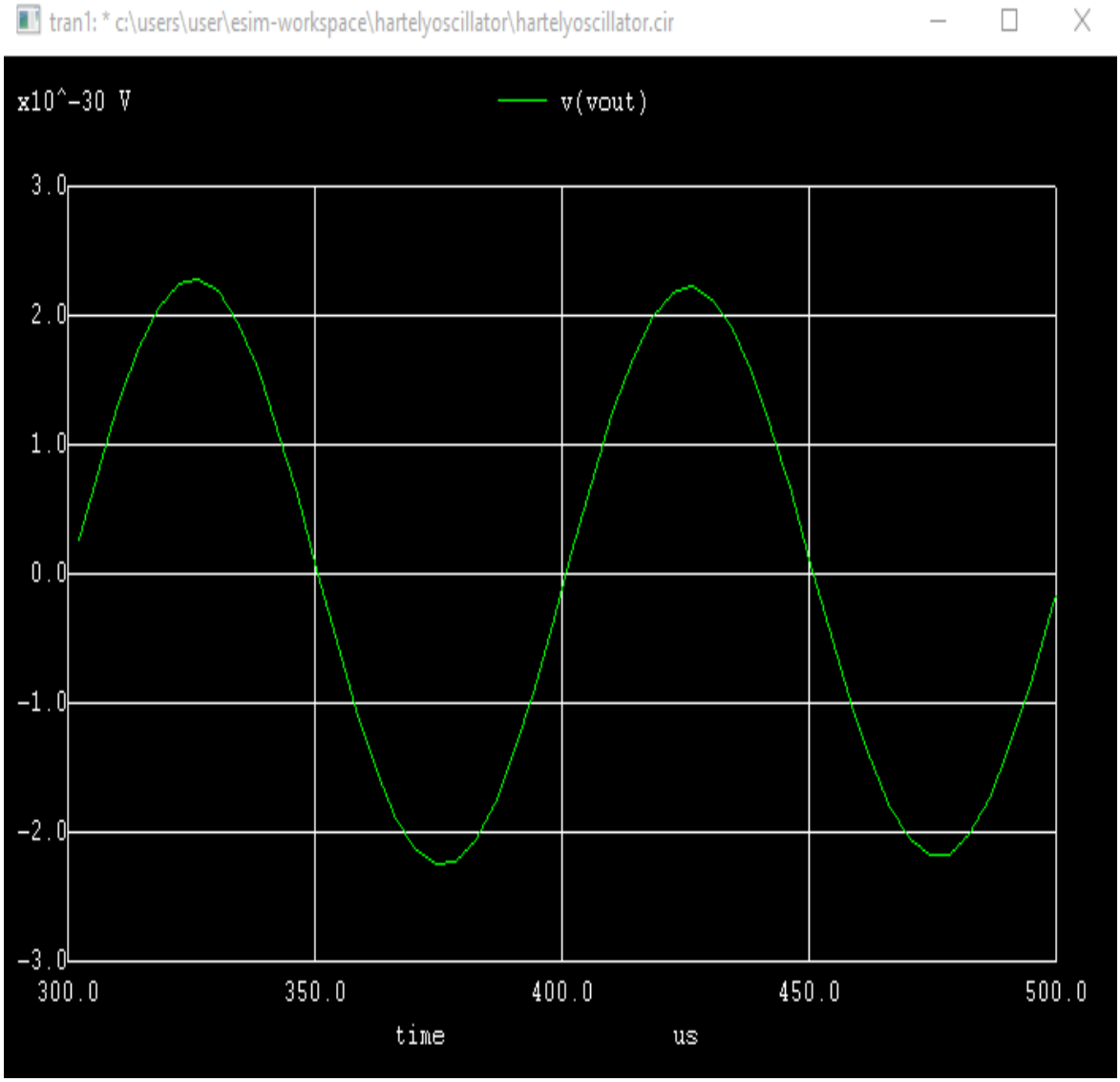
Transient analysis is generated to see the response of the oscillator to generate the output at desired frequency .

SIMULATION OUTPUT:

PYTHON PLOT:



NGSPICE PLOT:



REFERENCES:

https://www.electronicshub.org/hartley-oscillator/ on 10/11/2017