MUTUAL INDUCTANCE WITH TWO COILS RESONANT

Set Range to 10k
18 kHz  65 kHz

f_2 = 75 MHz

BOX 1

SAWTOOTH FROM SCOPE
100K
0-50K

VCO
3300pF

120 TURN COILS

2500pF

IN188

.001uF

BOX 2

TO SCOPE
MUTUAL INDUCTANCE WITH TWO COILS RESONANT

LC & RLC CIRCUITS - Resonance

Two 120-turn coils are placed facing each other on the lecture table. Each of the coils are in series with a capacitor, the values of which have been chosen such that the two LC circuits have slightly different resonant frequencies. One of the coils is driven by a sine wave generator, whose output is swept over a frequency range encompassing the resonance frequency of both LC circuits. When the voltage across the capacitor of the secondary coil is displayed on an oscilloscope, a double resonance curve caused by the resonance in each coil is observed.
MUTUAL INDUCTANCE W/ TWO COILS RESONANT

RESONANCE- LC Resonance

Two 120-turn coils are placed facing each other on the lecture table. Each of the coils is in series with a capacitor, the values of which have been chosen such that the two LC circuits have slightly different resonant frequencies. One of the coils is driven by a sine wave generator, whose output is swept over a frequency range encompassing the resonant frequency of both LC circuits. When the voltage across the capacitor of the secondary coil is displayed on an oscilloscope, a resonant curve caused by the resonance in each coil is observed.

\[ f = \frac{1}{2\pi} \left( \frac{1}{\sqrt{LC}} \right) \]

1st circuit (coil) \( L = 5 \times 10^{-3} \) H \( C = 3300 \) pF \( f = 39 \) kHz

2nd circuit (coil) \( L = 5 \times 10^{-3} \) H \( C = 2500 \) pF \( f = 45 \) kHz
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LC & RLC CIRCUITS - Resonance

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MUTUAL INDUCTANCE
W/TWO COILS RESONANT

RESONANCE-LC Resonance
MUTUAL INDUCTION
W/TWO COILS RESONANT

RESONANCE-LC Resonance

Parts List:
- Tektronix 533 scope
- HP 3310A function generator
- GenRad decade capacitor
- Two minibuses labeled "inductive coupling of LC circuits"
- 4- male banana to female BNC connector
- 5- BNC cables
- 2 -120 turn coils
- 2500pF capacitor

Setup:

1. Connect the 2500pF cap across the terminals of one of the coils
2. Attach the banana to BNC adaptor to each of the coils terminal pairs
3. Connect one banana to BNC adaptor between High and GND of the decade capacitor.
4. Wire the rest of the circuit according to schematic.
5. Set the decade capacitor to 3300pF.
6. Set the function generator to ~38KHZ. *Important: Range ± 10K at 8-1*
7. Set the scope to 10 msec/div., internal trigger, 1 v/cm vertical, DC coupled.

*NOTE: adjustment of resistor in Box 1 might be necessary.*

Operation:

Adjust both coils until the peaks of each resonant point are equal. By varying the coupling between the two coils, one can show that both amplitude and frequency are varied.