

Lab n°: 3 Impedance measurement

1-Goals

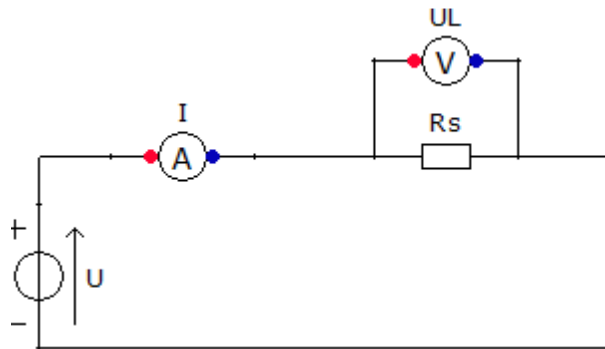
Measuring Impedance using the voltmeter-ammeter (V-A) method.

2- Materials

- Function generator, GBF • Milliammeter • Voltmeter • Millivoltmeter
- Capacitor * Inductor * Resistor

3.Continuous Rs (DC) measurement

- Write the equation of the montage
- Deduct the value of R_s



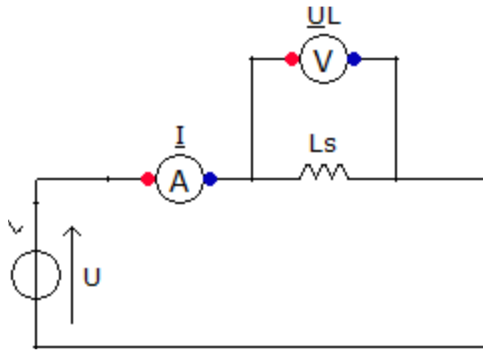
Take the measurements U , U_L and I by varying the voltage U from 2V to 10V

U	2V	4V	6V	8V	10 V
U_L					
I					
$Z=R_s=\frac{U}{I}$					

4-Measurement of R_s and L_s in sinusoidal (AC)

The coil is powered by a sinusoidal generator $u(t)$ with effective value $U = 7 V$ and variable frequency

- Write the assembly equation
- Carry out the assembly by placing the devices so as to note U , U_L and I
- Read U_L et I by varying from 10 Hz to 1 KHz (5 measurements)
- Calculate the value of Z for these measurements
- Deduce L_s



F [Hz]	10	50	100	500	1 KHz
U_L [V]					
I [A]					
$Z_L = \frac{U_L}{I}$ [Ω]					
L_s [mH]					
$Z_L = \frac{U}{I}$ [Ω]					

5-Manipulation: Resonance of a series RLC circuit

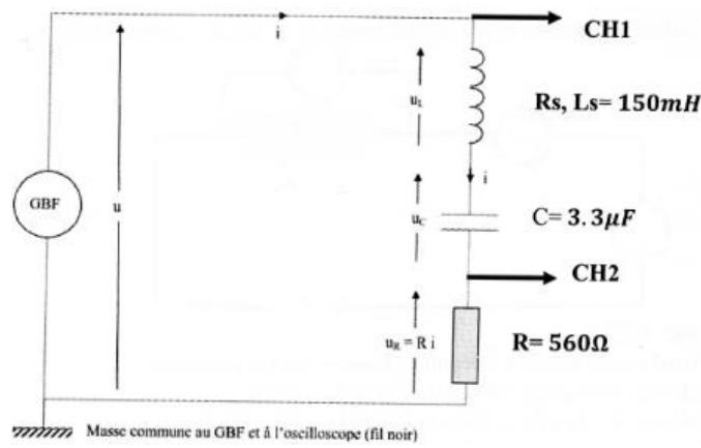
To study the resonance of the RLC circuit, we will carry out the following series assembly:

5.1. Necessary materials:

A GBF which delivers a sinusoidal signal (AC) with an amplitude of 10 V (this will be kept constant throughout the manipulation).

- A coil (Inductor) set to 150 **mH**
 - A capacitor set to **3.3 μF**
 - A resistor set to 560 Ω .
- a. Express the complex impedance of the dipole of series RLC
 - b. Express the module of the impedance,

In general, the impedance Z of a dipole is given by relationship: $Z = \frac{U_{max}}{I_{max}} = \frac{U_{eff}}{I_{eff}}$ being the effective voltage across the terminals of the dipole to study, and I the current circulating in this dipole.



f [Hz]	50	100	200	f_0	250	500
I[A]						
$U_R[V]$						
$U_C[V]$						
$U_L[V]$						
$Z = \frac{U}{I} [\Omega]$						
$R = \frac{U_R}{I} [\Omega]$						
$Z_C = \frac{U_C}{I} [\Omega]$						
$Z_L = \frac{U_L}{I} [\Omega]$						
$L_s [mH]$						

Conclusion:

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