Practice 3
Operational Amplifiers

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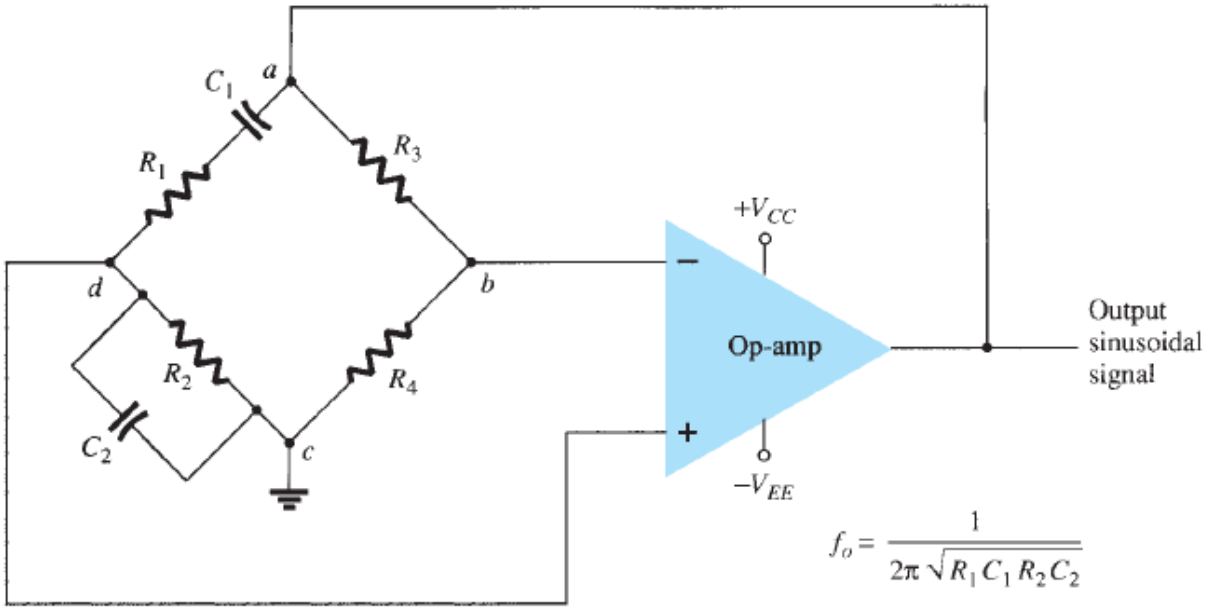
Summary

1. Wien Bridge Oscillator
2. Practice work 2: simulation
3. Control test

Wien Bridge Oscillator



$$\frac{R_3}{R_4} = \frac{R_1}{R_2} + \frac{C_2}{C_1}$$

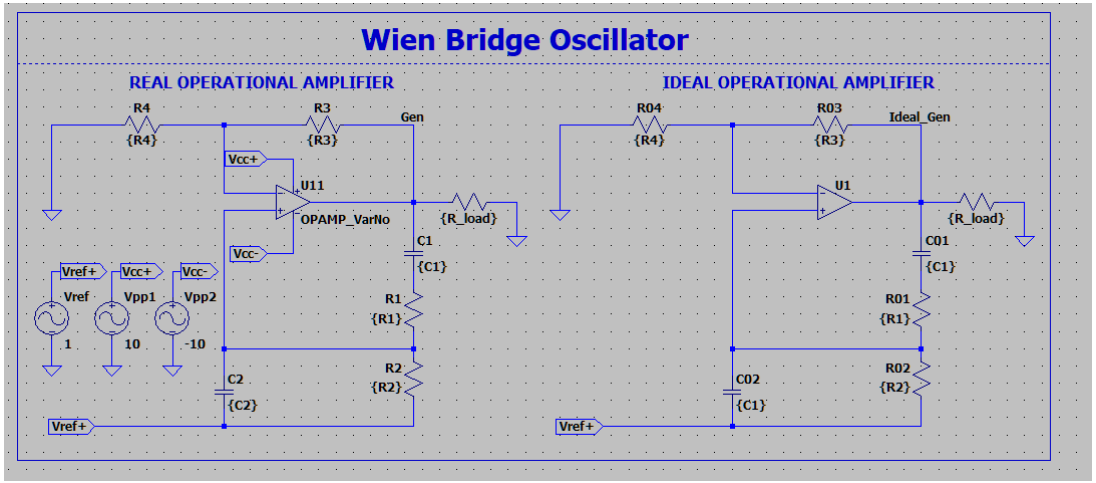
$$f_o = \frac{1}{2\pi\sqrt{R_1C_1R_2C_2}}$$

If, in particular, the values are $R_1 = R_2 = R$ and $C_1 = C_2 = C$, the resulting oscillator frequency is

$$f_o = \frac{1}{2\pi RC}$$

$$\frac{R_3}{R_4} = 2$$

Wien Bridge Oscillator



$$\frac{R_3}{R_4} = \frac{R_1}{R_2} + \frac{C_2}{C_1}$$

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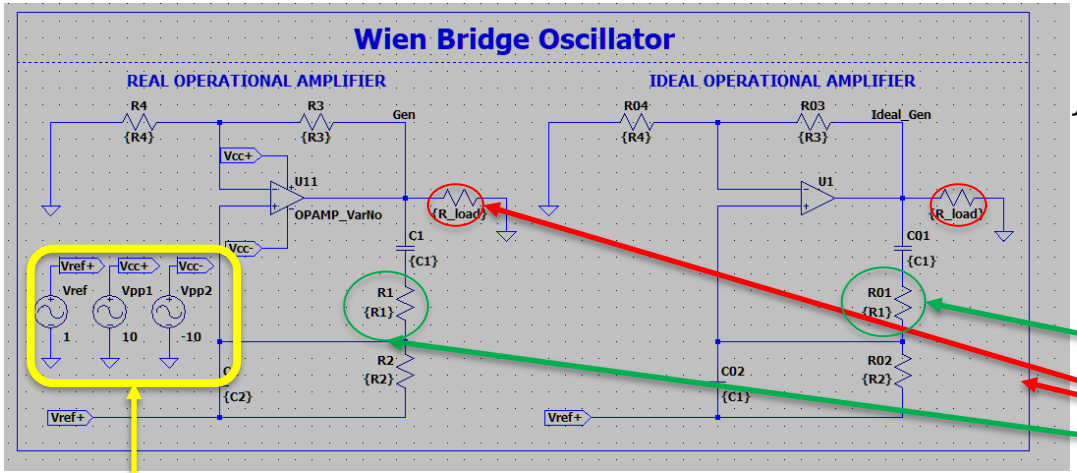
Wien Bridge Oscillator



$$f_0 = \frac{1}{2\pi\sqrt{R_1 R_2 C_1 C_2}} = \frac{1}{2\pi RC} = \frac{1}{2\pi R_1 C};$$

Source voltage frequency, [Hz]	Load resistance, [Ω]	Resistance , [Ω]	Voltage source power supply [V]	
f_{test}	R_{Load}	R_1	$Vcc \pm$	$Vref$
1000	1000000	10000	15	0,2

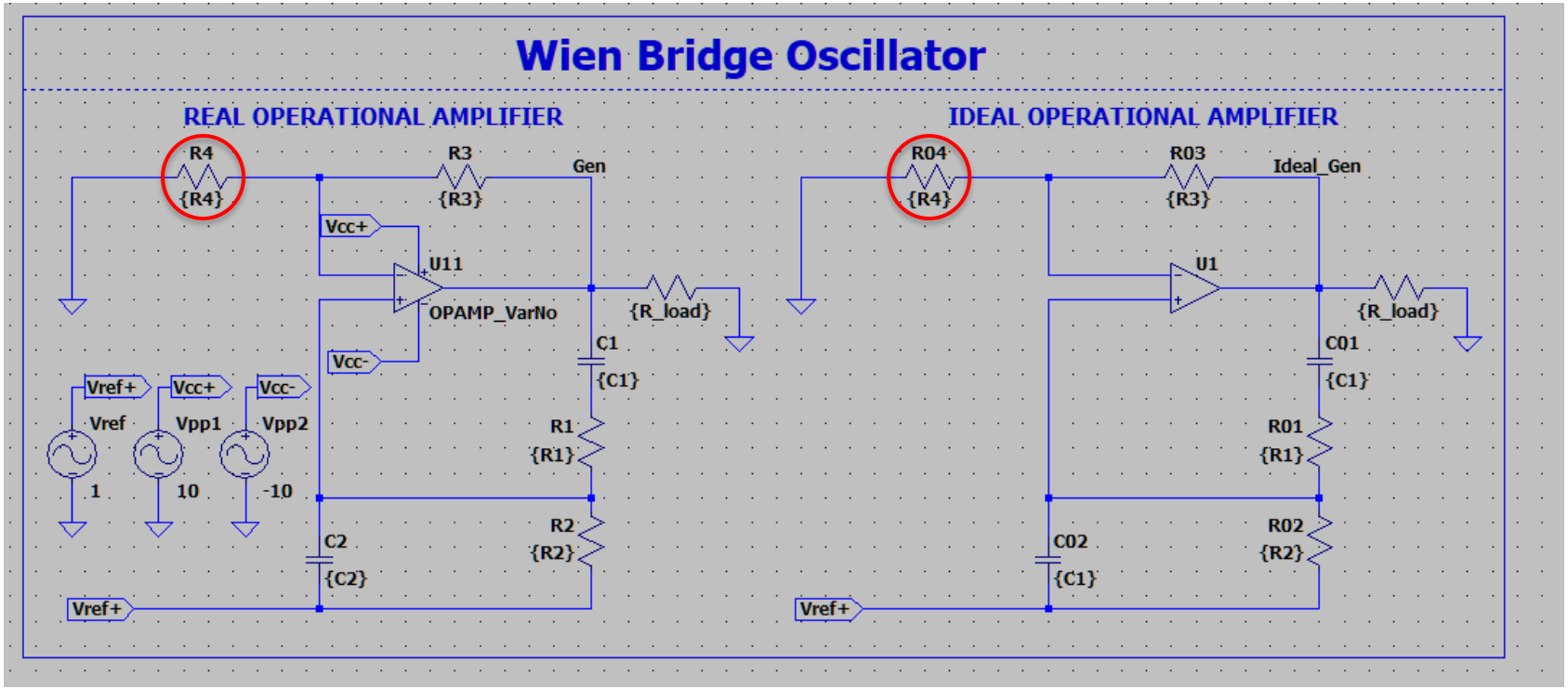
$$C_1 = C_2$$
$$R_1 = R_2$$
$$R_3 = 2R_4$$

$$C_1 = C_2 = \frac{1}{2\pi R_1 f_{test}}$$

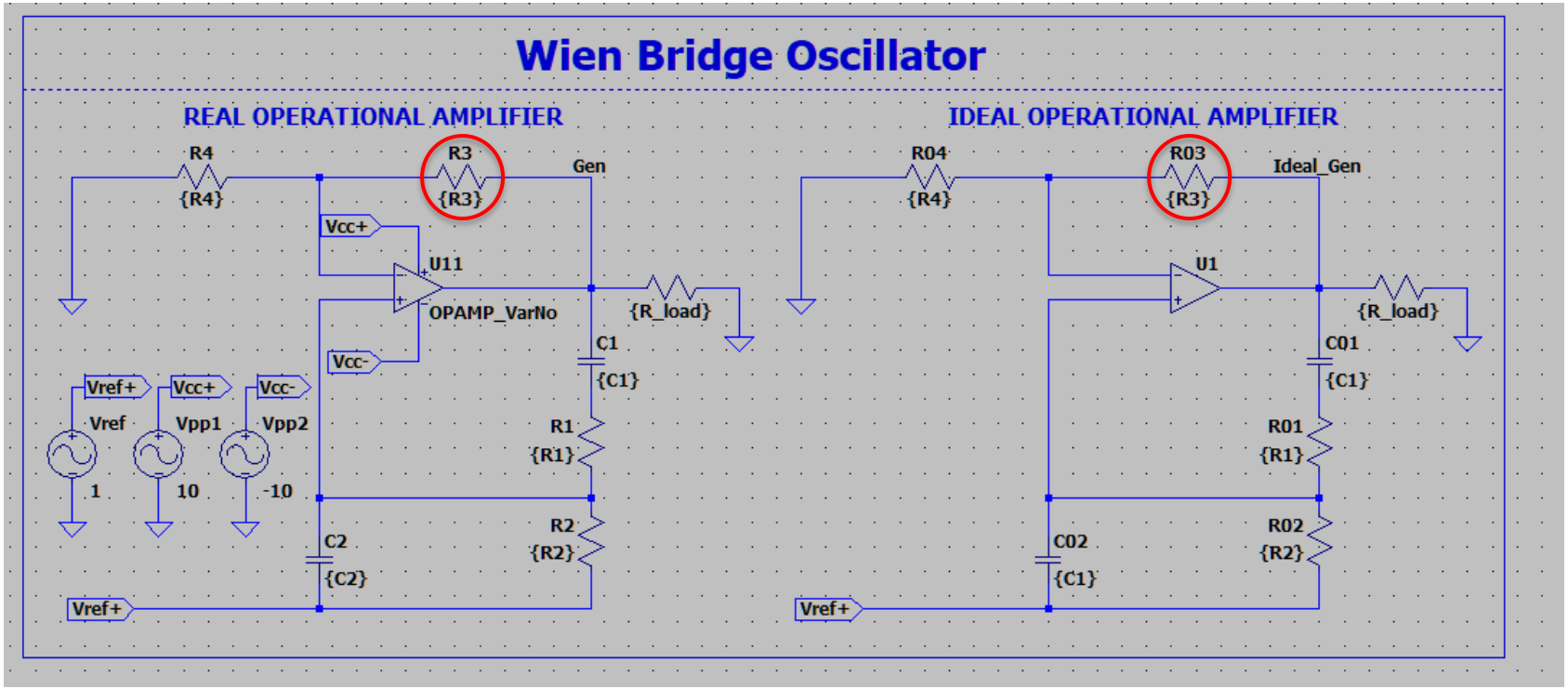
Choose real capacitor

$$f_0 = \frac{1}{2\pi R_1 C_{1\_real}}$$

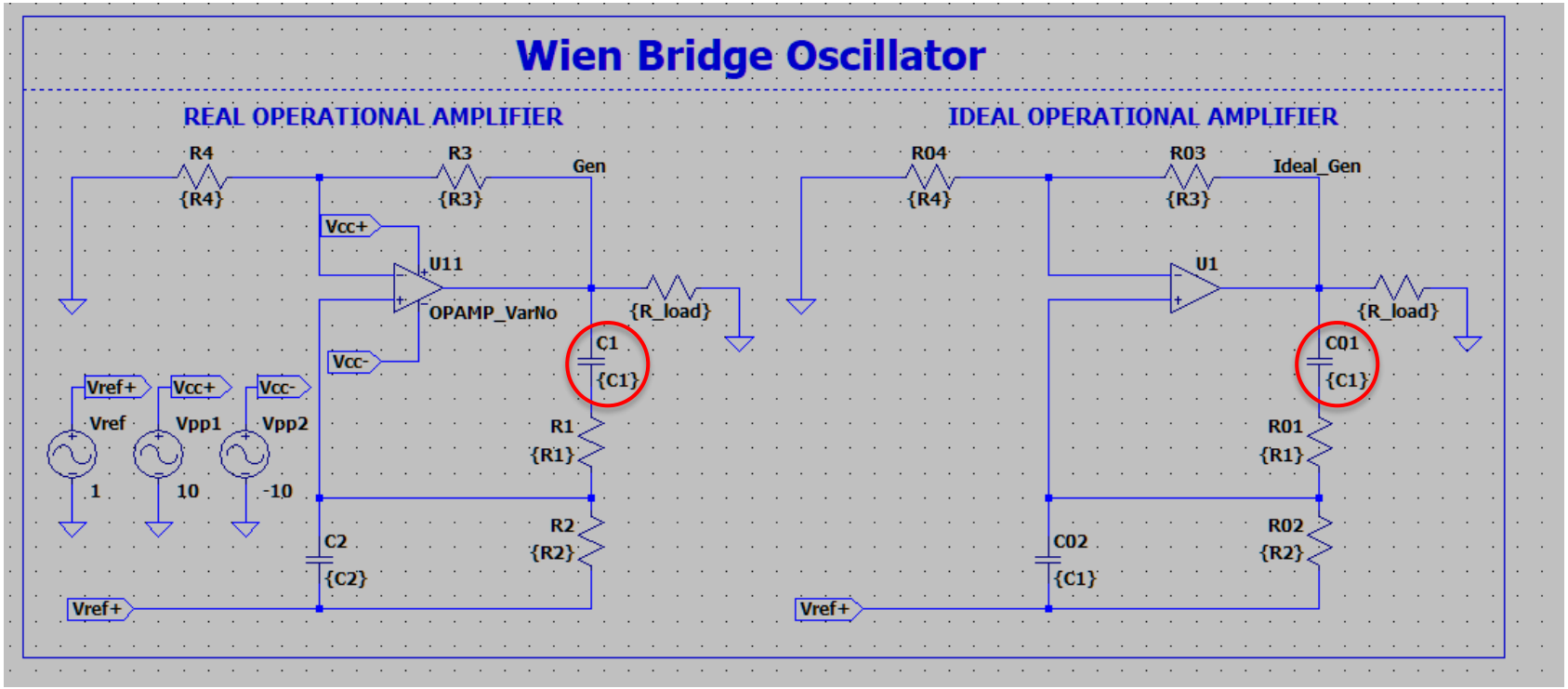
Wien Bridge Oscillator



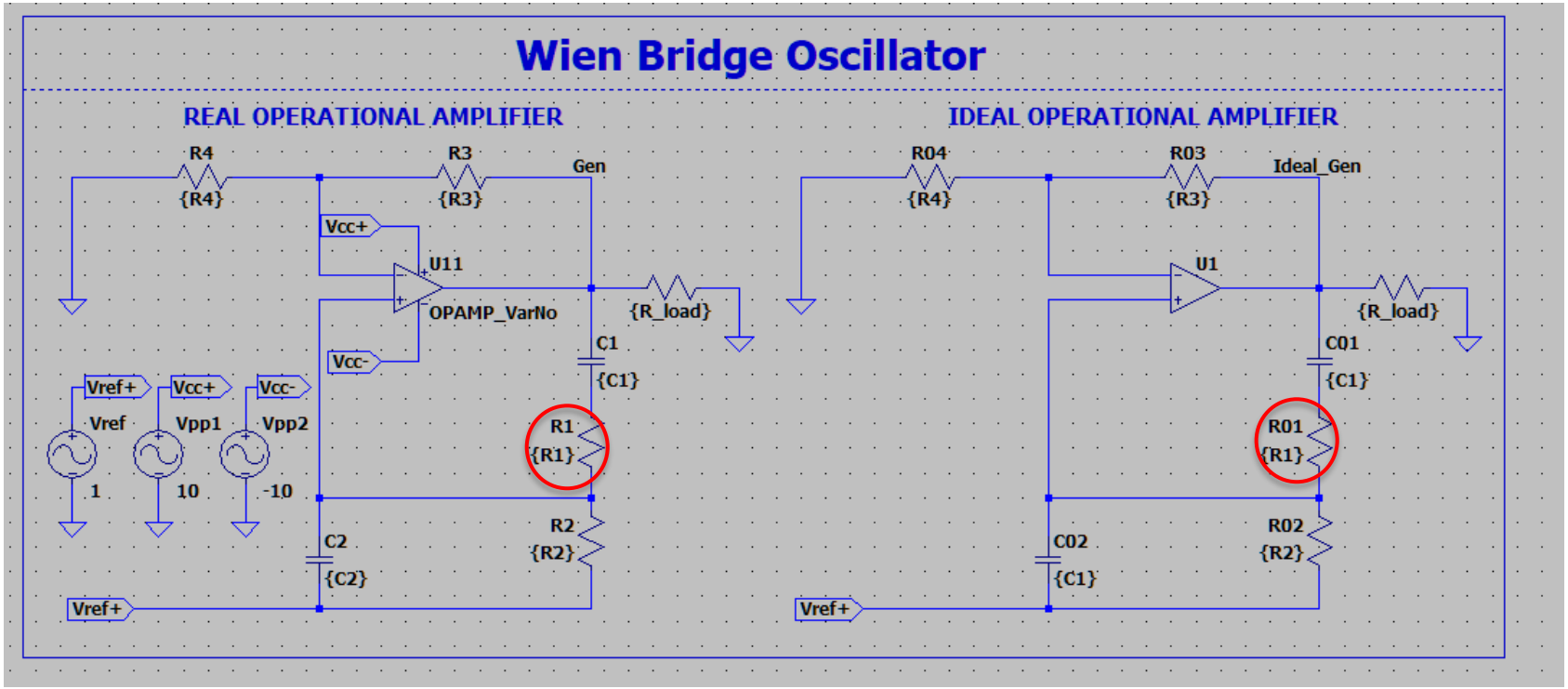
Wien Bridge Oscillator



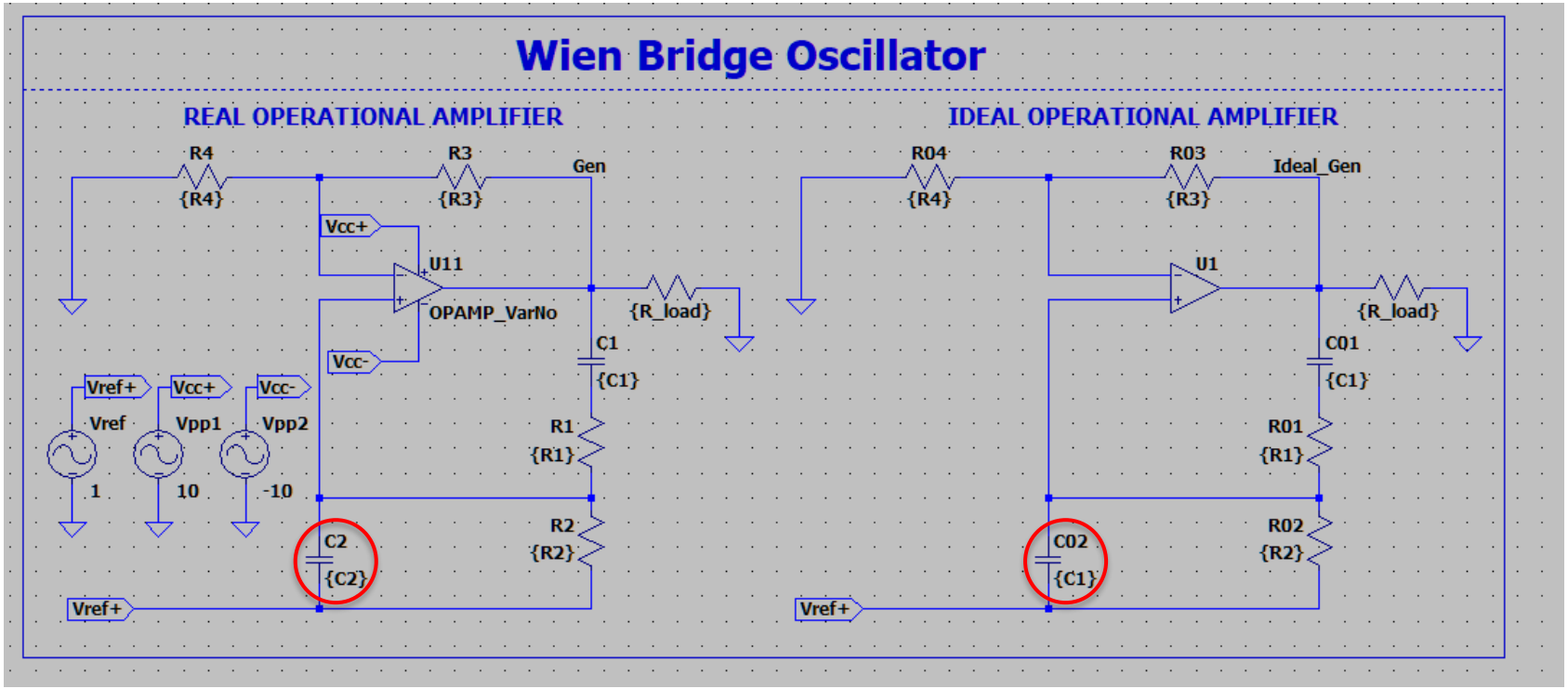
Wien Bridge Oscillator



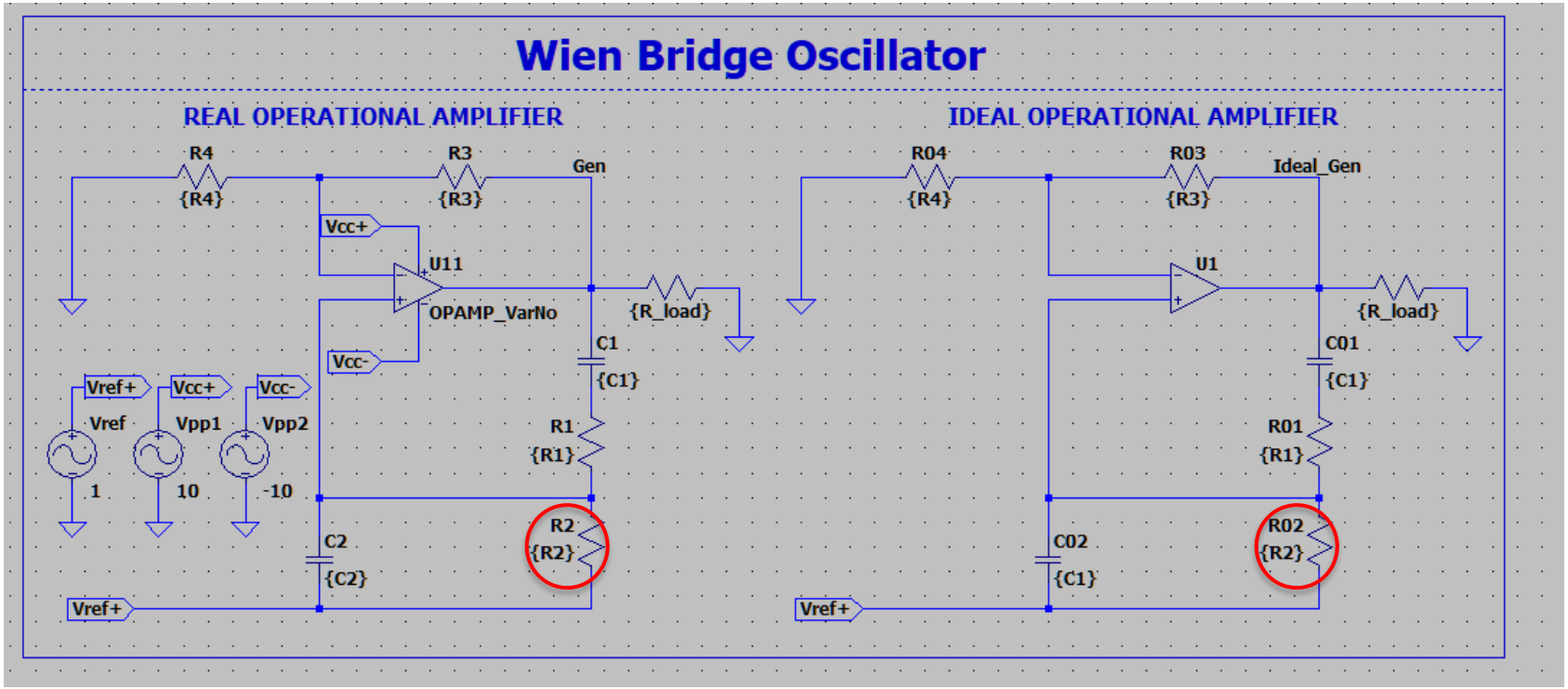
Wien Bridge Oscillator



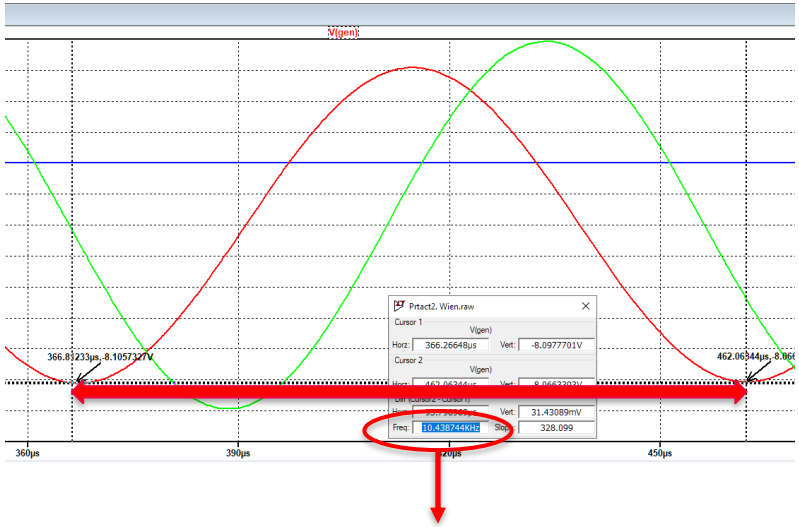
Wien Bridge Oscillator



Wien Bridge Oscillator

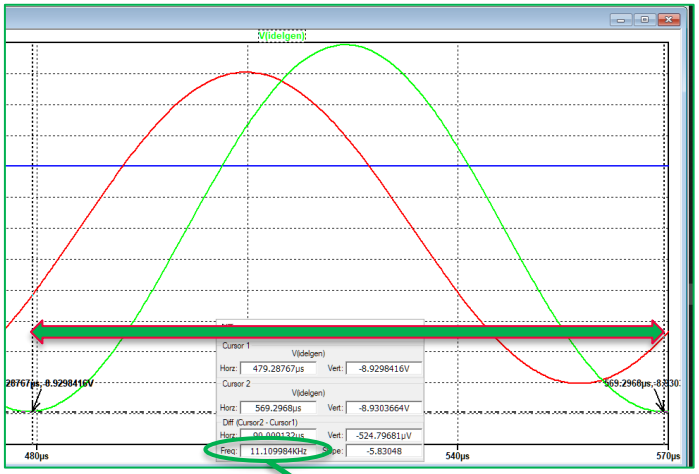


Wien Bridge Oscillator



f_{0_real} =10.44kHz

Real operational amplifier

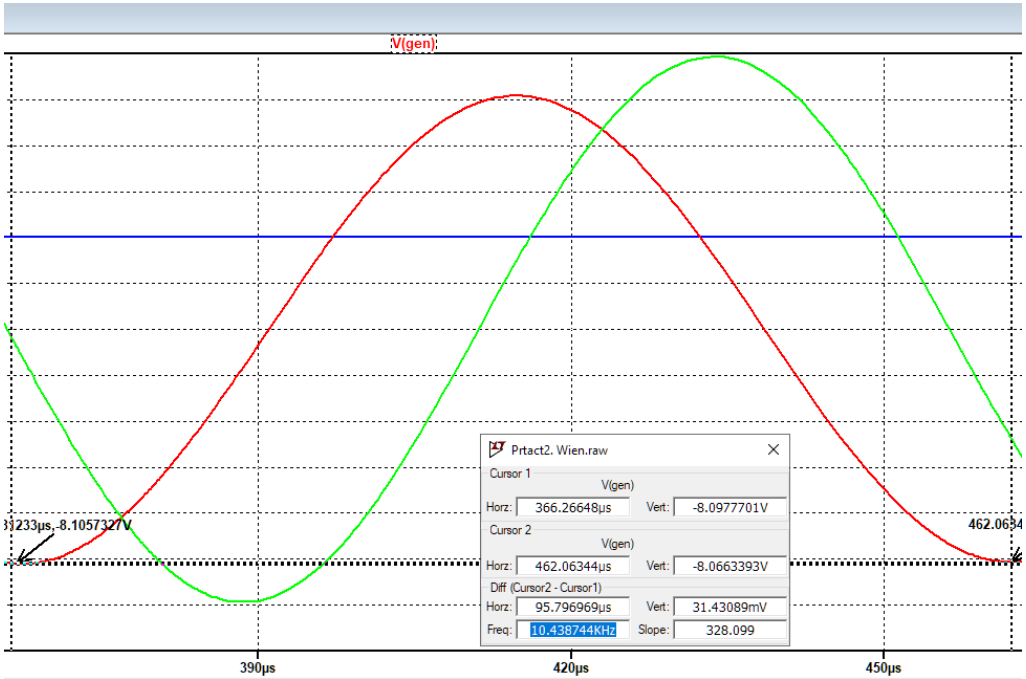


f_{0_ideal} =11.11kHz

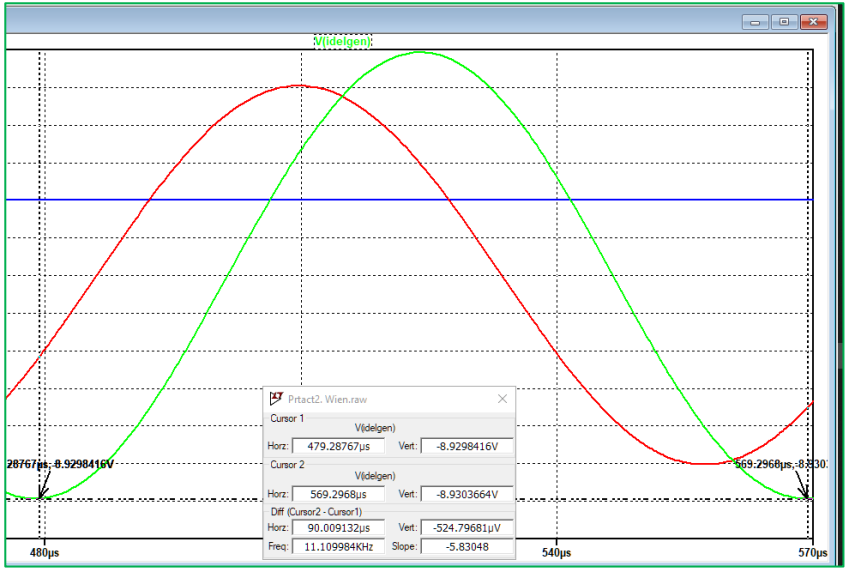
Ideal operational amplifier

$$f_{0\_calculated} = \frac{1}{2\pi\sqrt{R_1 R_2 C_1 C_2}} = \frac{1}{2\pi * 110 * 10^{-12} * 130 * 10^{3}} = 11{,}129\text{kHz}$$

Wien Bridge Oscillator



Real operational amplifier



Ideal operational amplifier

Test 2

https://forms.yandex.com/cloud/6372342c5d2a0664e323da80/

https://clck.ru/32gh38

1st deadline: 15.11.2022 15:15 (GMT +8)

Practice 3

1st deadline: 25.11.2022 15:15 (GMT +8)

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Thanks for your attention!