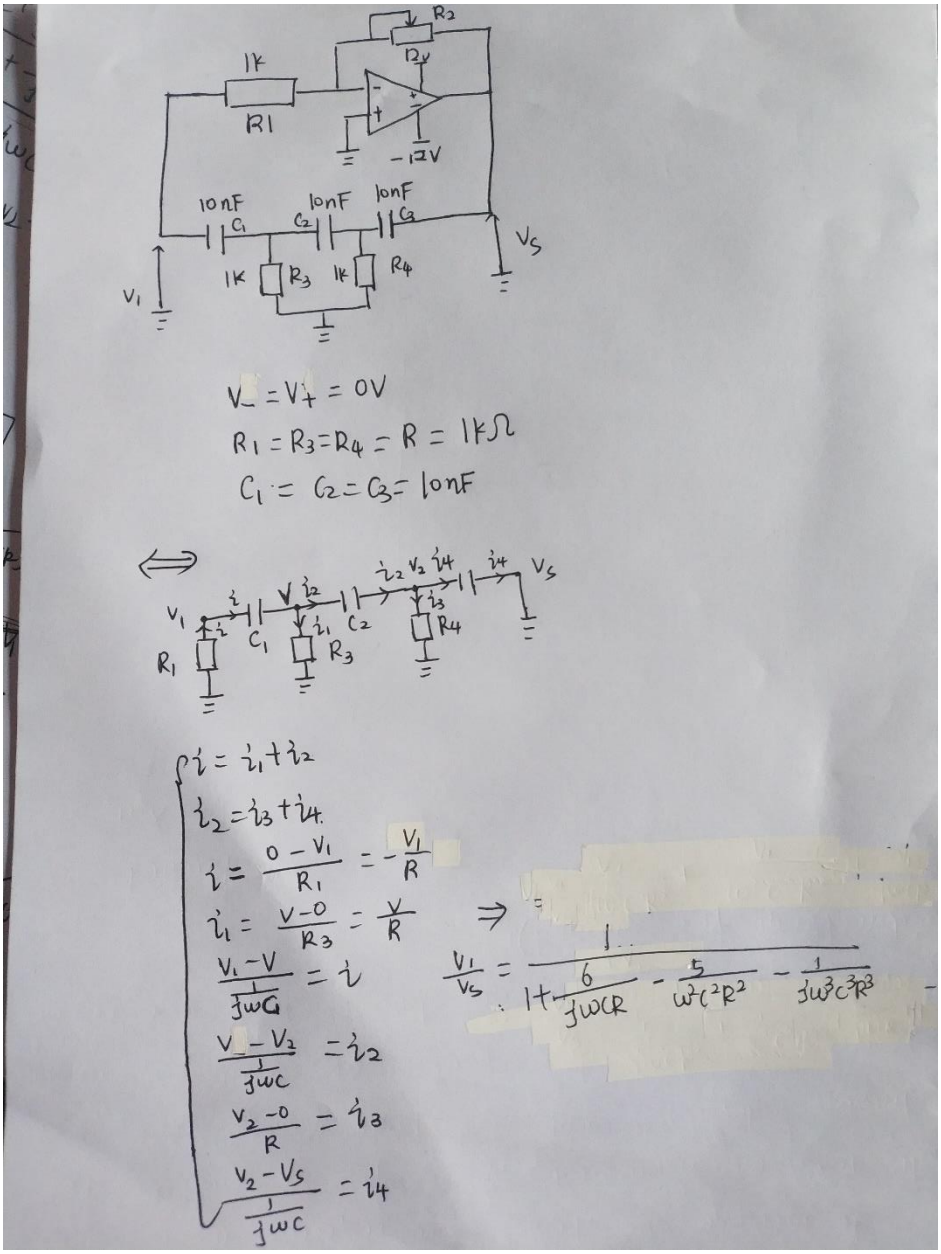
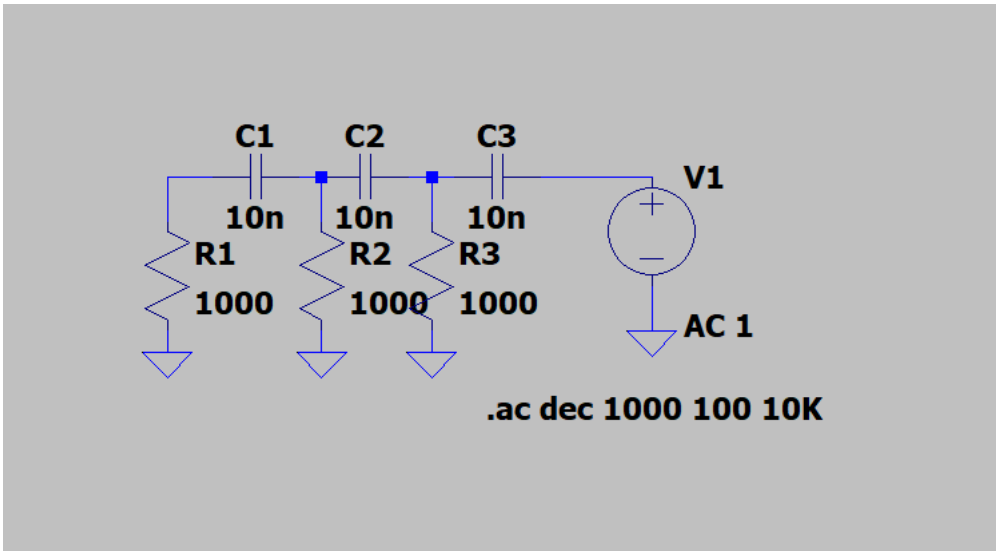
# Oscillateur à déphaseur RC

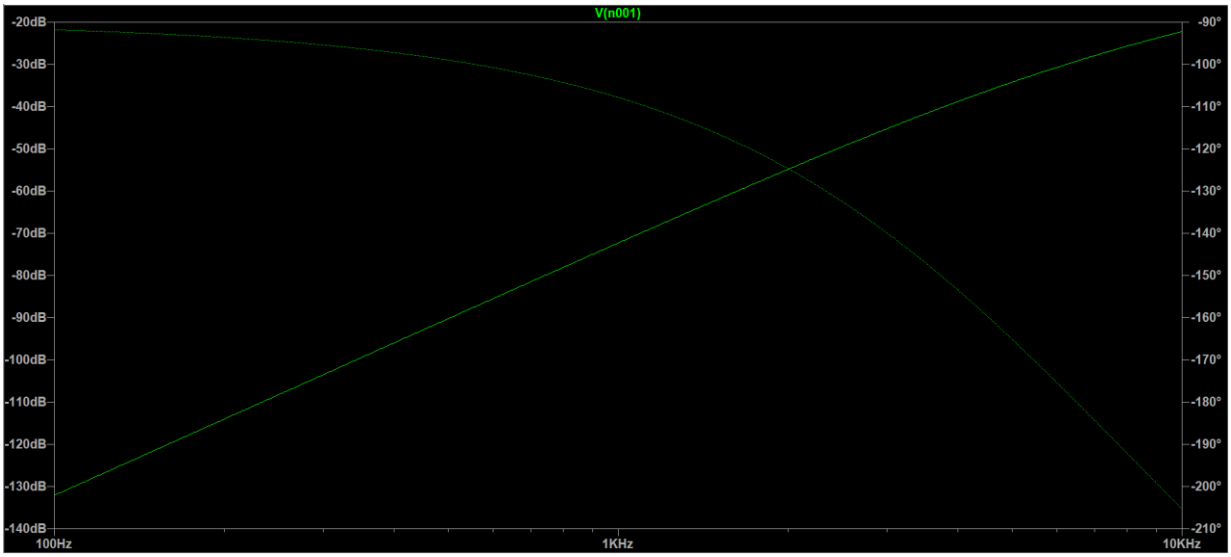
1.




2. Le circuit :




Le résultat :




3. D'après la question 1 :

$$\beta(j\omega) = \frac{1}{1 - \left(\frac{5}{\omega^2 C^2 R^2} + \frac{6j}{\omega CR} - \frac{j}{\omega^3 C^3 R^3}\right)}$$

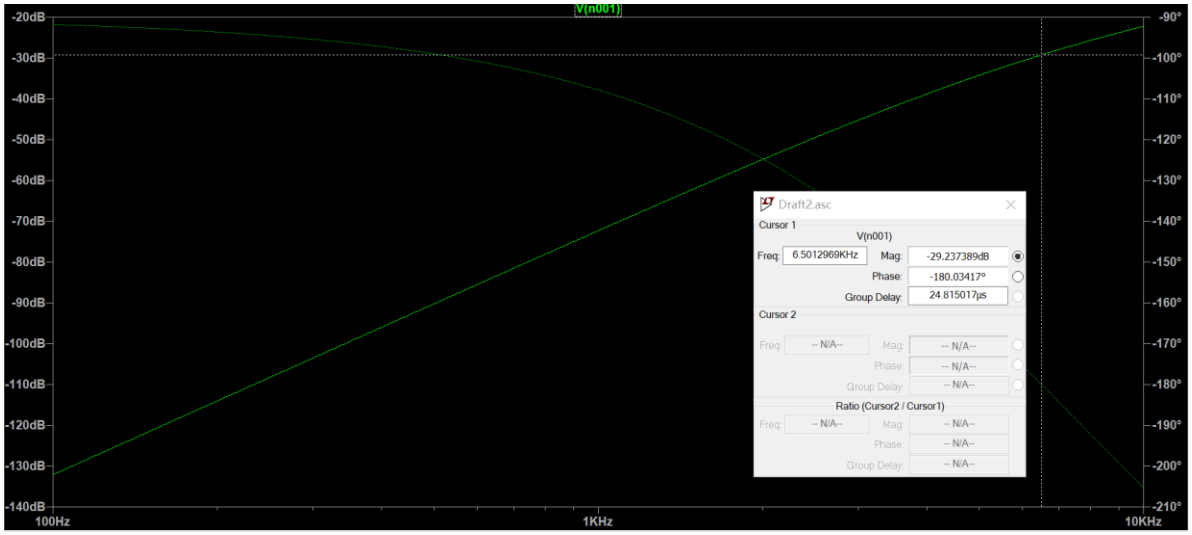
$$\varphi = -arctan\frac{6(\omega CR)^2 - 1}{(\omega CR)^3 - 5\omega CR} = -\pi$$

$$\omega_0 = \frac{1}{\sqrt{6}CR}$$

$$|\beta(j\omega)|_{\omega=\omega_0} = \frac{1}{29}$$

$$A = \frac{1}{|\beta|} = 29$$

$$f_0 = \frac{1}{2\pi\sqrt{6}RC} = 6497.5Hz$$



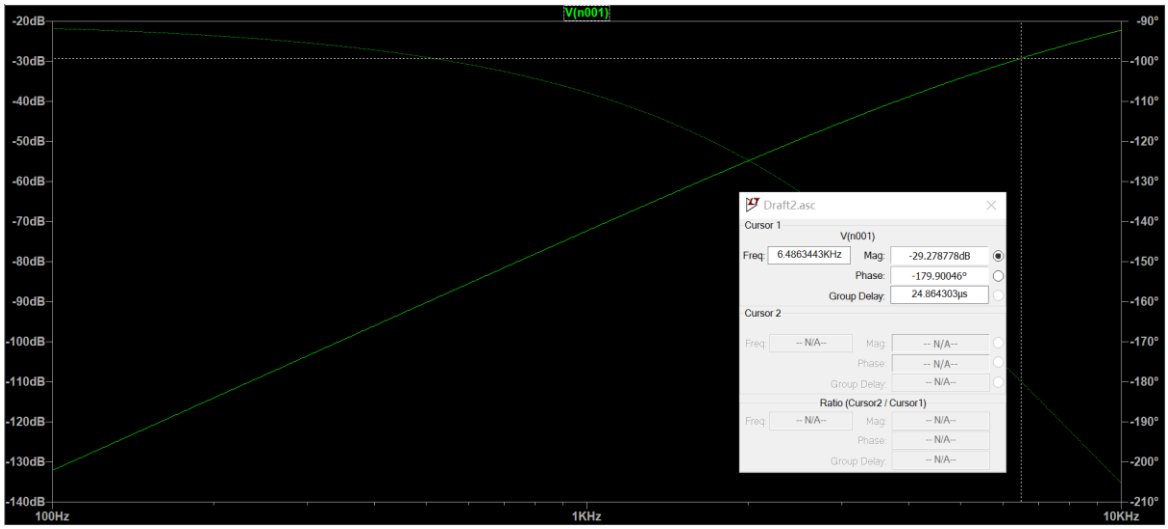

On peut voir que A=-29.24

$$f_0 = 6501.3Hz$$

4. La stabilité est définie par :

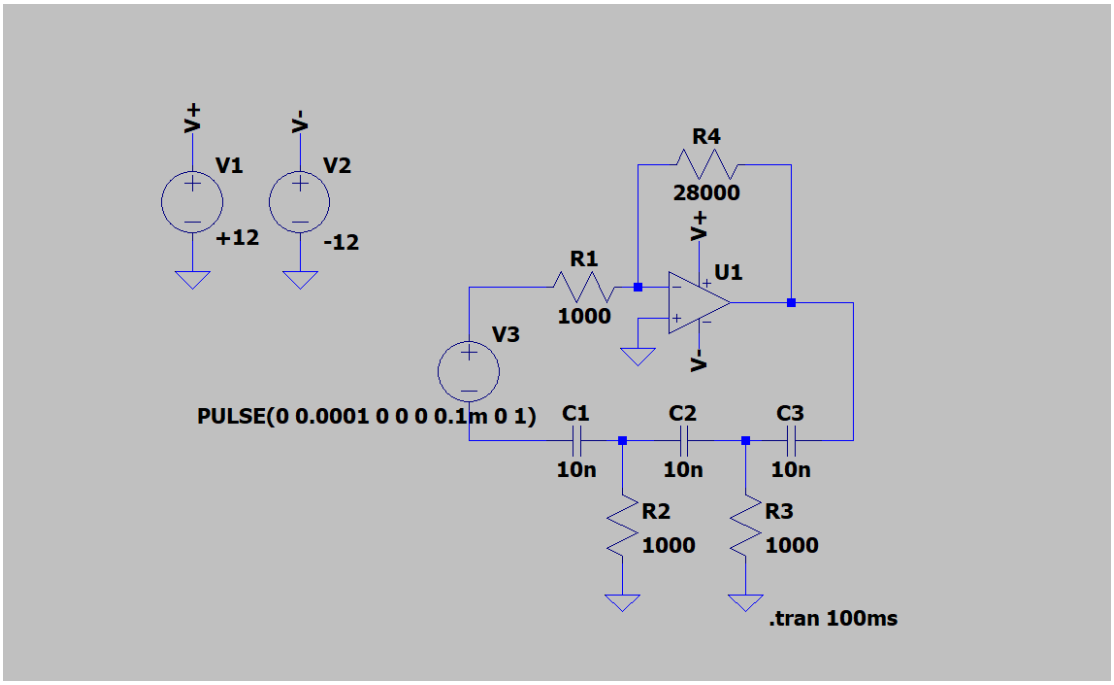
$$S(\omega_0) = |\frac{d\varphi(\beta(j\omega))}{d(\omega/\omega_0)}|_{\omega=\omega_0}$$

Donc, $S(\omega_0) = \left|-\frac{12}{(\omega_0 CR)^2-5} \times \omega_0 CR\right| = \frac{12\sqrt{6}}{29} \approx 1.01$

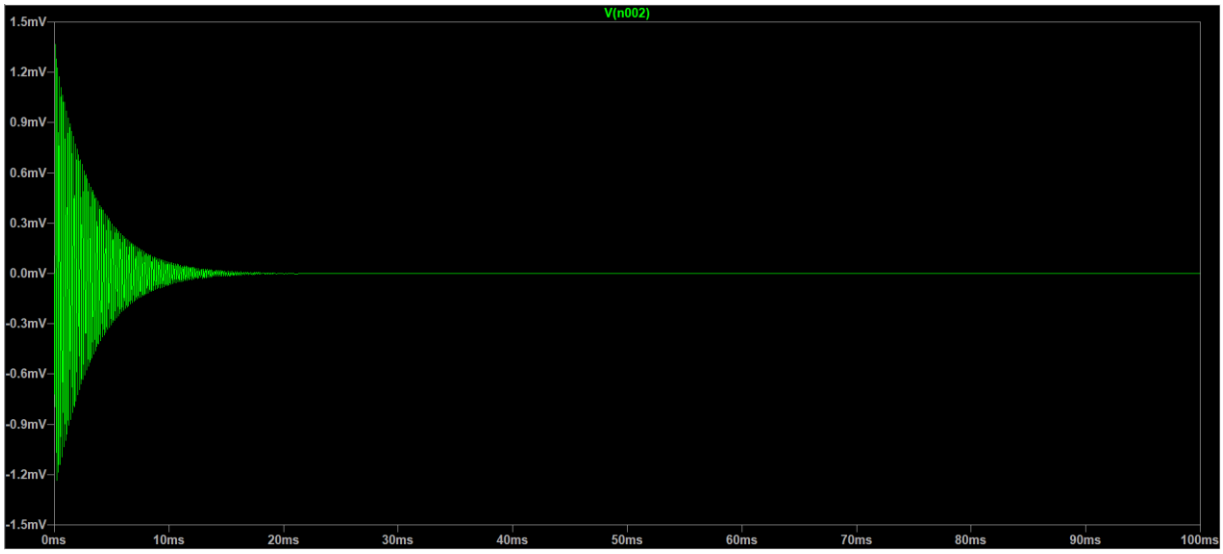


Donc, $S(\omega_0) = |\frac{d\varphi(\beta(j\omega))}{d(\omega/\omega_0)}|_{\omega=\omega_0} = |\frac{d\varphi(\beta(j\omega))}{d\omega}\omega_0|_{\omega=\omega_0} = |\frac{d\varphi(\beta(j\omega))}{df}\frac{\omega_0}{2\pi}|_{\omega=\omega_0} = |\frac{(180.03417°-179.90046°)/180°\times\pi}{6501.3-6486.3}\frac{\omega_0}{2\pi}|_{\omega=\omega_0} \approx 1.011$

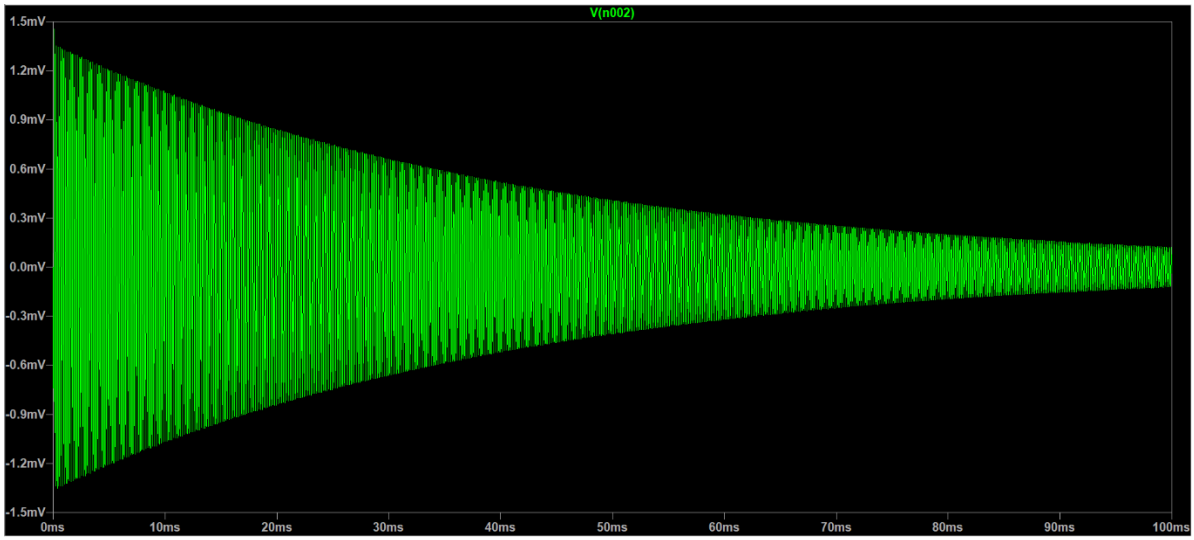
5.



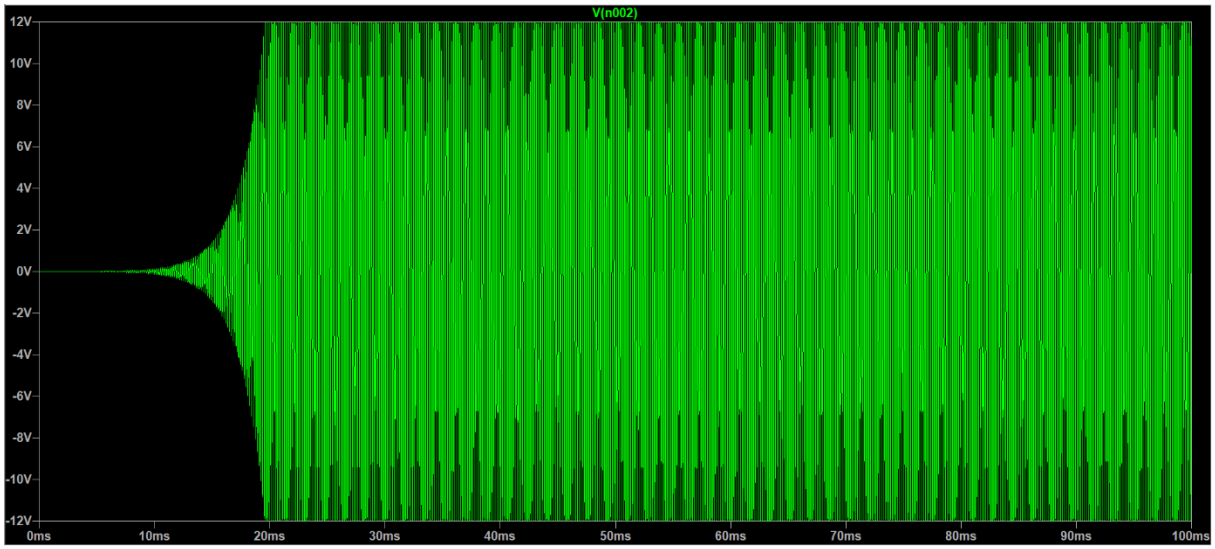

6. Quand on choisit $R_2 = 28000\Omega$, $A\beta < 1$, on a :



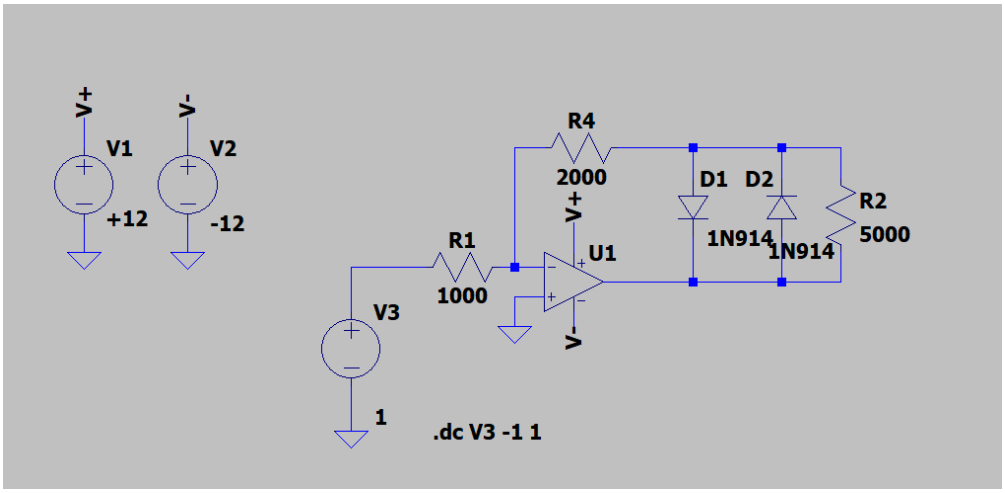

Quand on choisit $R_2 = 29000\Omega$, $A\beta = 1$, on a :



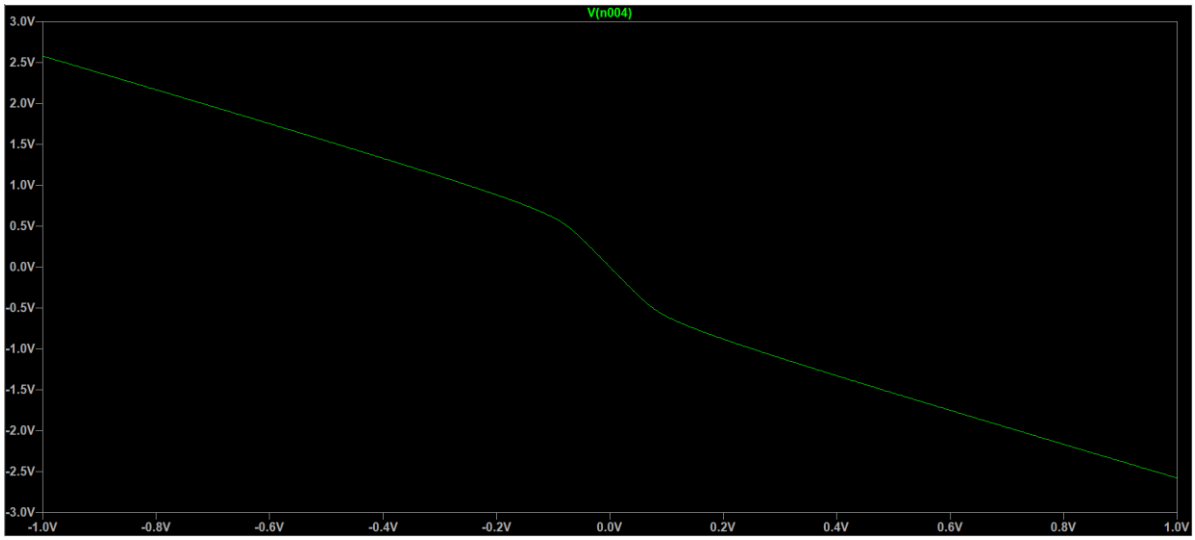

Quand on choisit $R_2 = 31000\Omega$, $A\beta > 1$, on a :




7.



8.




Il apparaît la non-linéarité du gain introduite par les diodes.