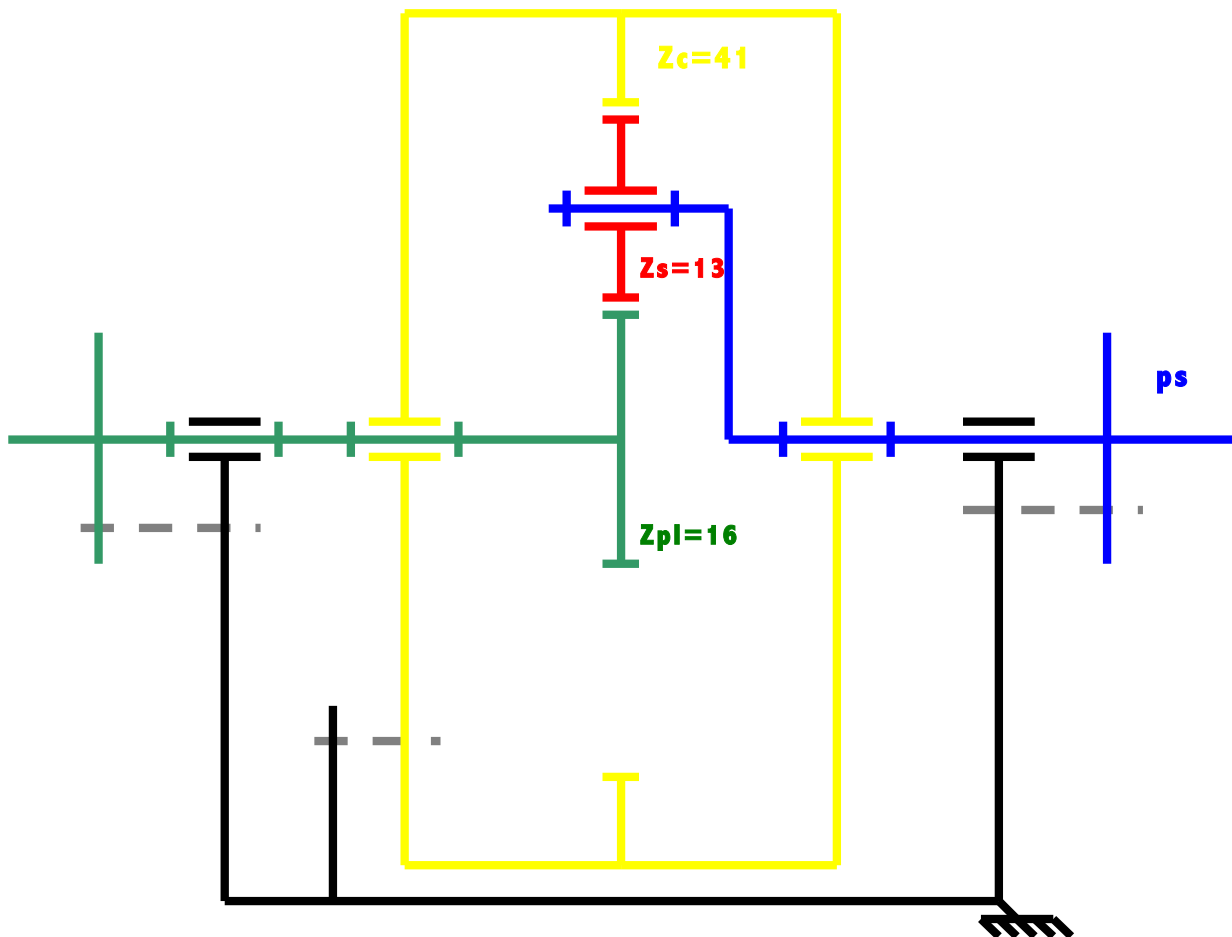


MAQUETTE TRAIN EPICYCLOIDAL

I. Schéma cinématique et caractéristiques du train



Pl : Planétaire
 S : Satellites
 C : Couronne
 Ps : Porte satellites

$Z_{pl}=16, Z_{ps}=13, Z_c=41$

Rapport basique :

$$R_b = (-1)^n \frac{\text{Produit } Z_{menantes}}{\text{Produit } Z_{menees}}$$

$$R_b = (-1)^1 \frac{Z_{pl} \times Z_s}{Z_s \times Z_c}$$

$$R_b = -\frac{16}{41}$$

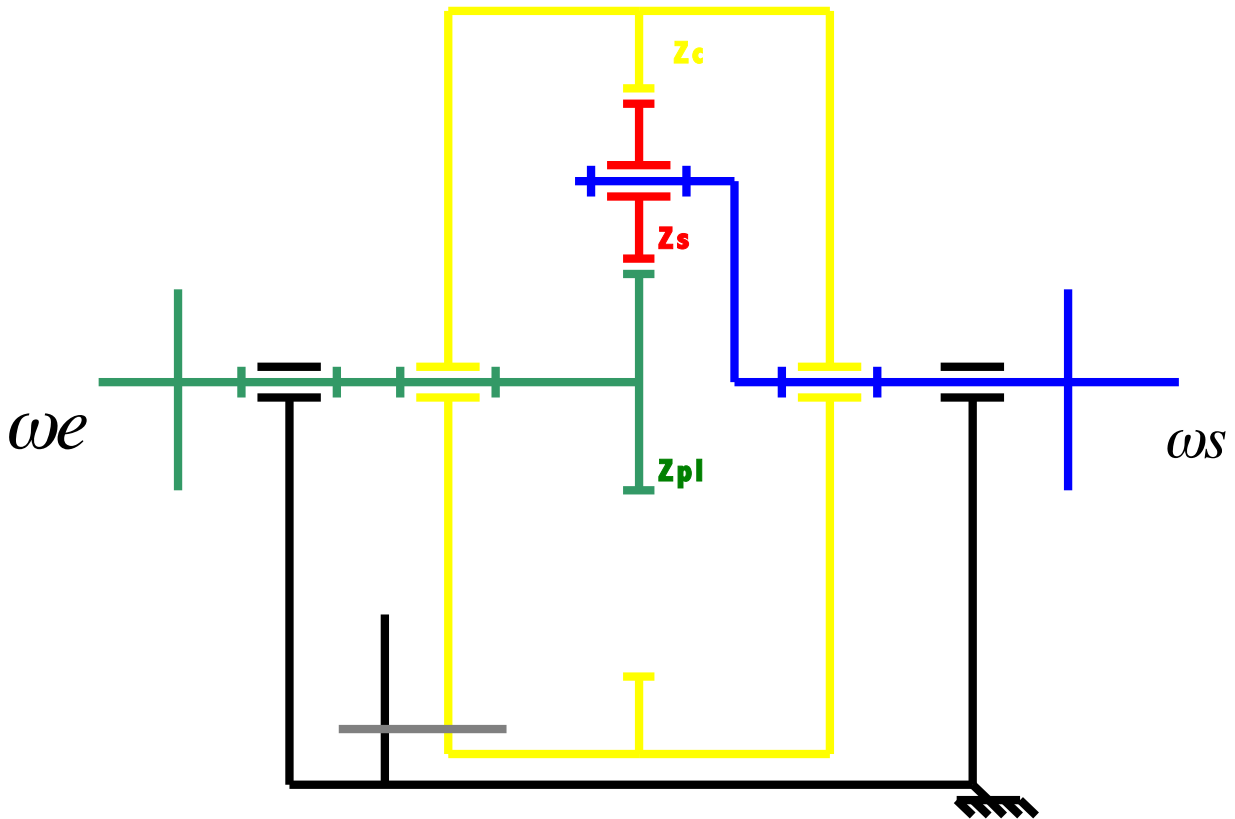
$$R_b = -0,39$$

2. Les différents cas de figure

	Entrée	Bloquée	Sortie
Cas 1	$W_e=W_{pl}$	$W_c=0$	$W_s=W_{ps}$
Cas 2 inverse 1	$W_e=W_{ps}$	$W_c=0$	$W_s=W_{pl}$
Cas 3	$W_e=W_{pl}$	$W_{ps}=0$	$W_s=W_c$
Cas 4 inverse 3	$W_e=W_c$	$W_{ps}=0$	$W_s=W_{pl}$
Cas 5	$W_e=W_{ps}$	$W_{pl}=0$	$W_s=W_c$
Cas 6	$W_e=W_c$	$W_{pl}=0$	$W_s=W_{ps}$
Cas 7	$W_e=W_{pl}$	$W_c=W_{pl}$	$W_s=W_c$

3. Les rapports observés et calculés

Cas 1 :



$$\omega e = \omega pl$$

$$\omega c = 0$$

$$\omega s = \omega ps$$

$$*Rg = \frac{\omega s}{\omega e} = \frac{\omega ps}{\omega pl}$$

*D'après Willis :

$$Rb = \frac{-\omega ps}{\omega pl - \omega ps}$$

$$Rb\omega pl - Rb\omega ps = -\omega ps$$

$$Rb\omega pl = \omega ps(Rb - 1)$$

$$\frac{\omega ps}{\omega pl} = \frac{Rb}{Rb - 1}$$

$$Rg = \frac{Rb}{Rb - 1}$$

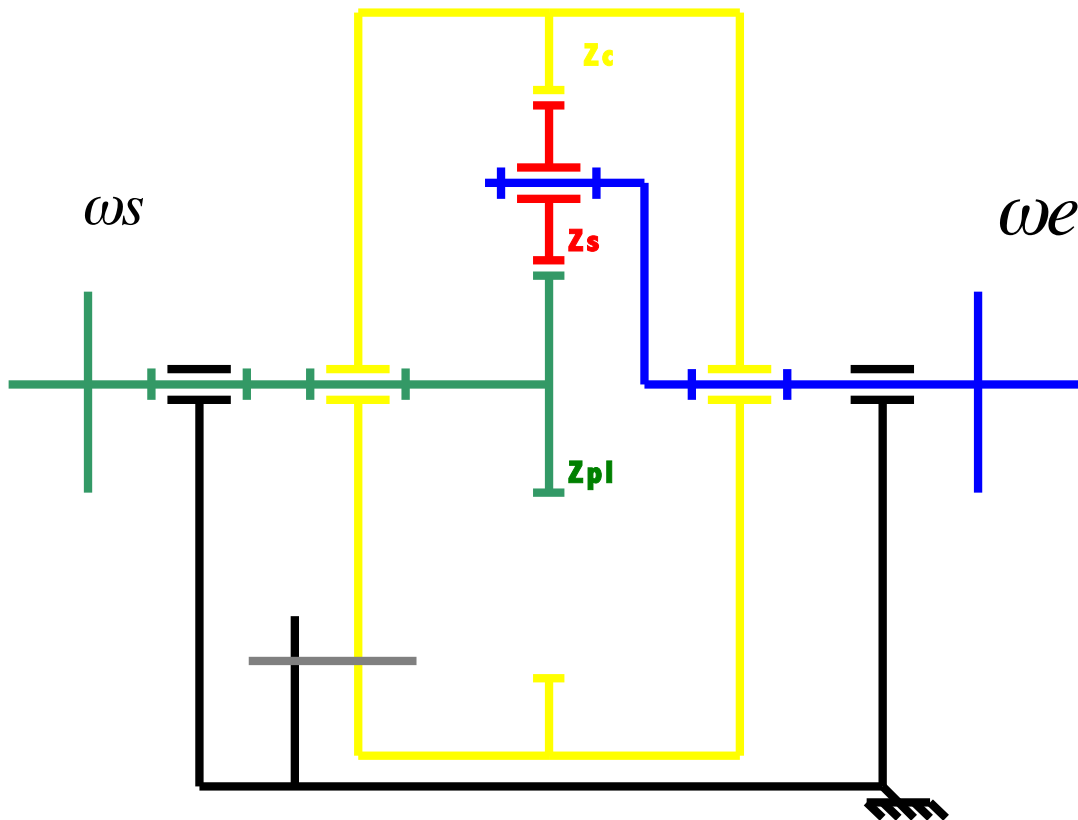
$$Rg = 0,28$$

$$Npl=18 \text{ trs}$$

$$Nps=5 \text{ trs}$$

$$Rg=5/18=0,28$$

Cas 2 : Inverse du cas 1



$$\omega_e = \omega_{ps}$$

$$\omega_c = 0$$

$$\omega_s = \omega_{pl}$$

$$*R_g = \frac{\omega_s}{\omega_e} = \frac{\omega_{pl}}{\omega_{ps}}$$

*D'après Willis :

$$R_b = \frac{-\omega_{ps}}{\omega_{pl} - \omega_{ps}}$$

$$R_b \omega_{pl} - R_b \omega_{ps} = -\omega_{ps}$$

$$R_b \omega_{pl} = \omega_{ps}(R_b - 1)$$

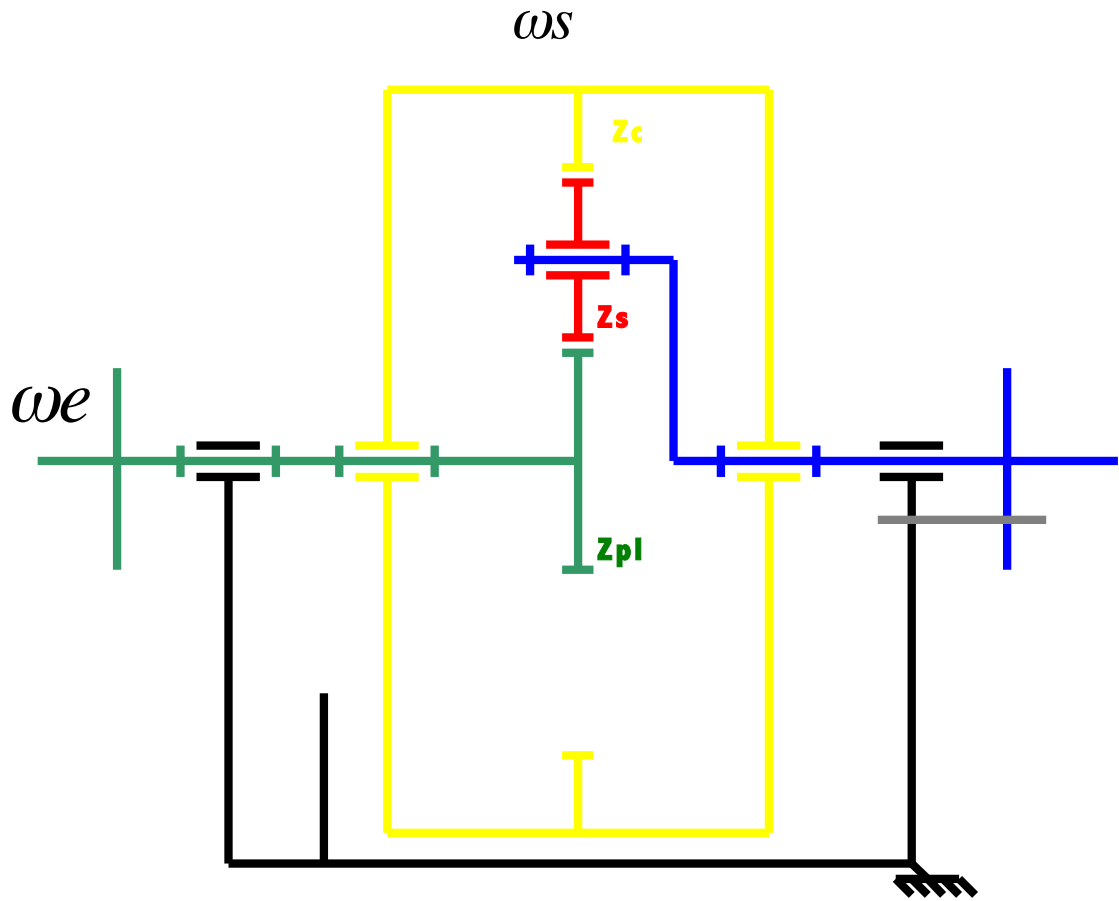
$$\frac{\omega_{ps}}{\omega_{pl}} = \frac{R_b - 1}{R_b}$$

$$R_g = \frac{R_b - 1}{R_b}$$

$$R_g = 3,56$$

$R_g = 1/0,28 = 3,57$

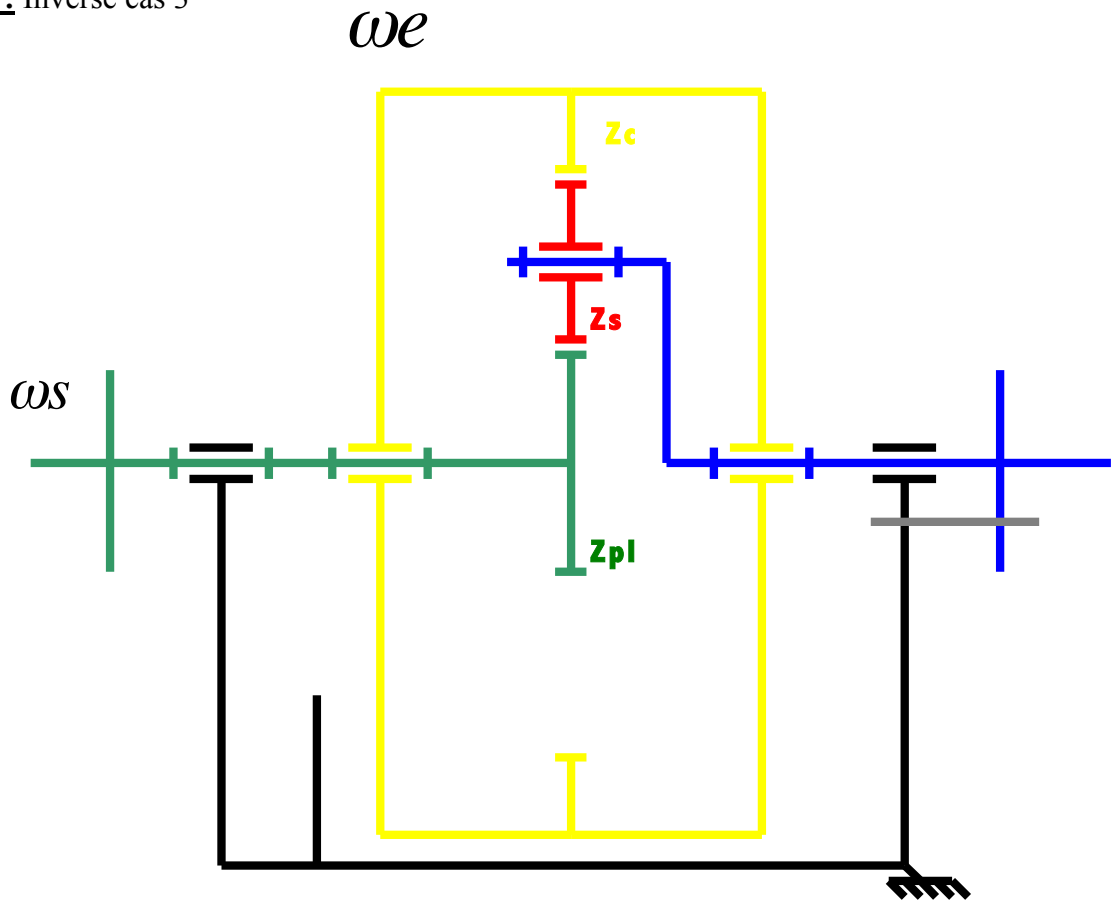
Cas 3 :



$\omega e = \omega pl$
 $\omega ps = 0$
 $\omega s = \omega c$
 $*Rg = \frac{\omega s}{\omega e} = \frac{\omega c}{\omega pl}$
 $*D'après Willis :$
 $Rb = \frac{\omega c}{\omega pl}$
 $Rg = Rb$
 $Rg = -0,39$

$N_{tpl}=18$
 $N_{tc}=7$
 $Rg=7/18=-0,39$ (sens inverse)

Cas 4 : Inverse cas 3



$$\omega e = \omega c$$

$$\omega ps = 0$$

$$\omega s = \omega pl$$

$$*Rg = \frac{\omega s}{\omega e} = \frac{\omega pl}{\omega c}$$

*D'après Willis :

$$Rb = \frac{\omega c}{\omega pl}$$

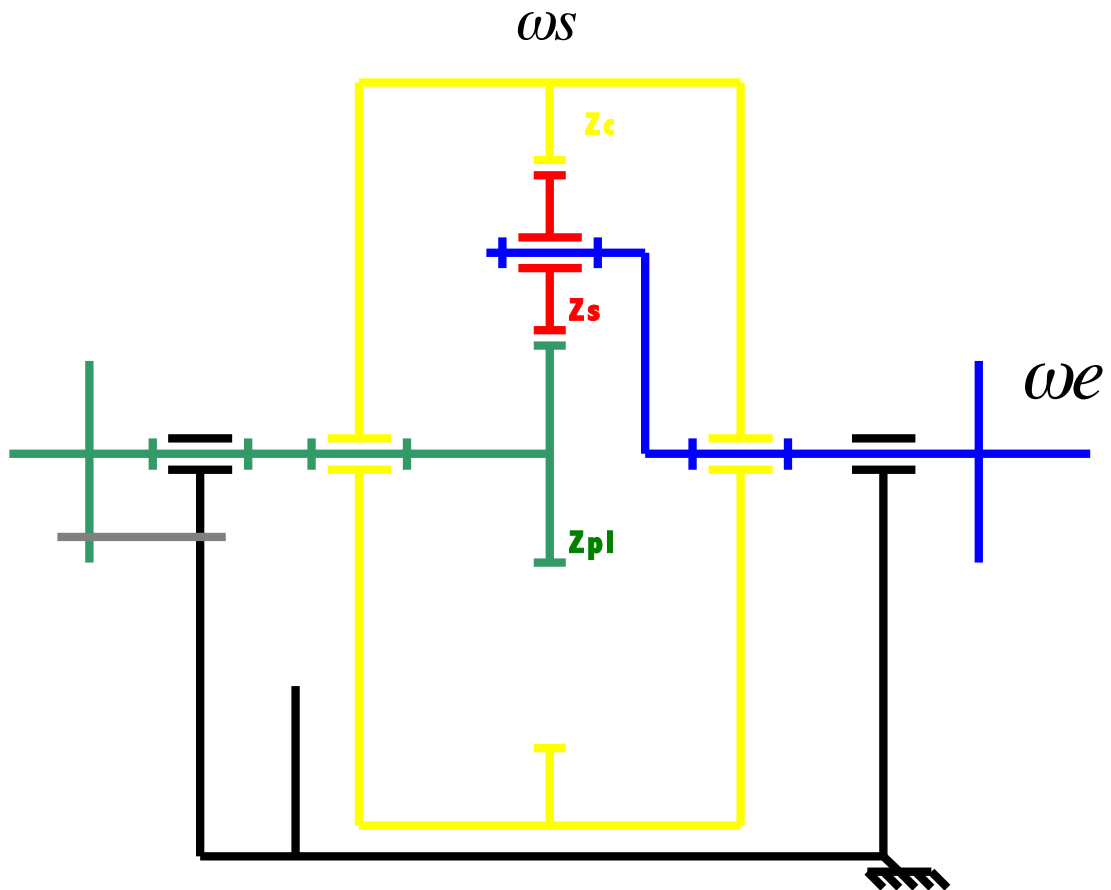
$$\frac{\omega pl}{\omega c} = \frac{1}{Rb}$$

$$Rg = \frac{1}{Rb}$$

$$Rg = -2,56$$

$$Rg = 1/(-0,39) = -2,56$$

Cas 5:



$$\omega e = \omega ps$$

$$\omega pl = 0$$

$$\omega s = \omega c$$

$$*Rg = \frac{\omega s}{\omega e} = \frac{\omega c}{\omega ps}$$

*D'après Willis :

$$Rb = \frac{\omega c - \omega ps}{-\omega ps}$$

$$\omega ps(1 - Rb) = \omega c$$

$$\frac{\omega c}{\omega ps} = 1 - Rb$$

$$Rg = 1 - Rb$$

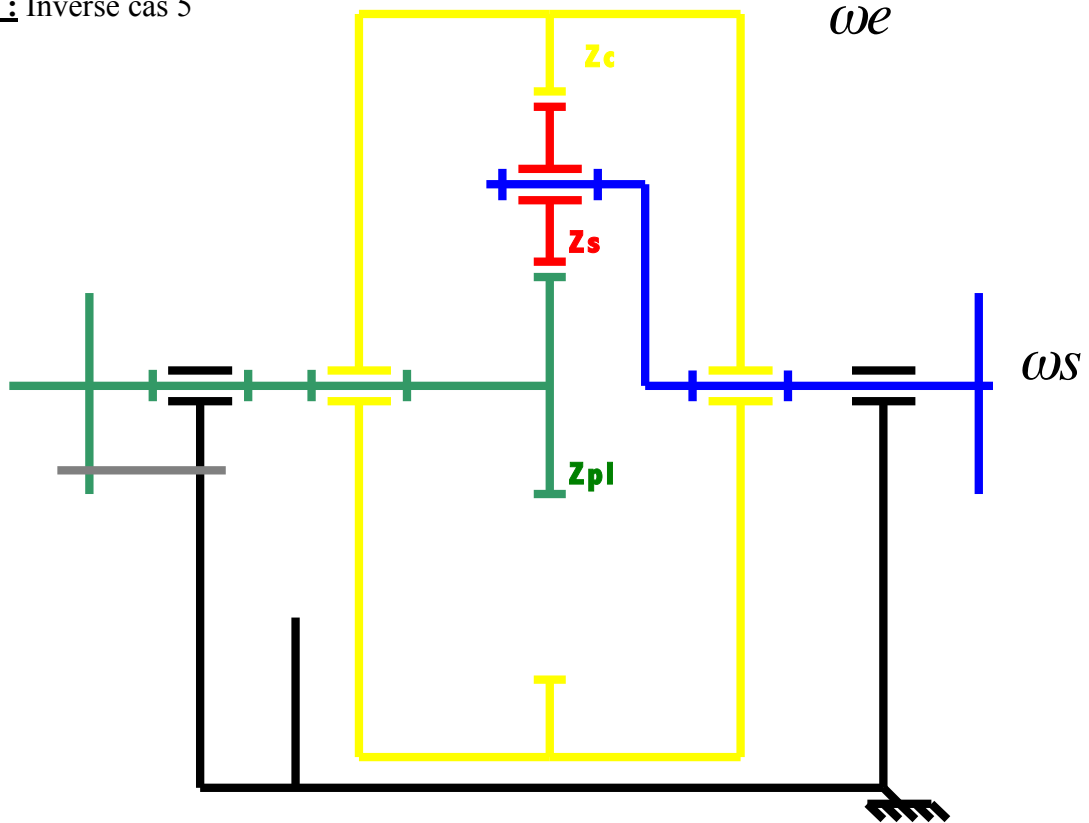
$$Rg = 1,39$$

$$Ntps=18$$

$$Ntc=25$$

$$Rg=25/18=1,39$$

Cas 6 : Inverse cas 5



$$\omega_e = \omega_c$$

$$\omega_{pl} = 0$$

$$\omega_s = \omega_{ps}$$

$$*R_g = \frac{\omega_s}{\omega_e} = \frac{\omega_{ps}}{\omega_c}$$

*D'après Willis :

$$R_b = \frac{\omega_c - \omega_{ps}}{-\omega_{ps}}$$

$$\omega_{ps}(1 - R_b) = \omega_c$$

$$\frac{\omega_{ps}}{\omega_c} = \frac{1}{1 - R_b}$$

$$R_g = \frac{1}{1 - R_b}$$

$$R_g = 0,72$$

$$R_g = 1/1,39 = 0,72$$

Cas 7 :

$$\omega_e = \omega_{pl}$$

$$\omega_c = \omega_{pl}$$

$$\omega_s = \omega_c$$

$$*R_g = \frac{\omega_s}{\omega_e} = \frac{\omega_c}{\omega_{pl}} = 1$$

$$R_g = 1$$

$$\omega_s = \omega_e$$

$$R_g = 1$$