

## Train simple ★

A3-05

**Question 1** Tracer le graphe des liaisons.

C2-06

**Question 2** Déterminer  $\omega_{40}$  en fonction de  $\omega_{30}$  et  $\omega_{10}$ .

En bloquant le porte satellite, on a :  $\frac{\omega_{43}}{\omega_{13}} = \frac{Z_1 Z_{22}}{Z_{21} Z_4}$ . On a donc,  $\frac{\omega_{40} + \omega_{03}}{\omega_{10} + \omega_{03}} = \frac{Z_1 Z_{22}}{Z_{21} Z_4}$

$$\Leftrightarrow \omega_{40} + \omega_{03} = \frac{Z_1 Z_{22}}{Z_{21} Z_4} (\omega_{10} + \omega_{03}) \Leftrightarrow \omega_{40} = \frac{Z_1 Z_{22}}{Z_{21} Z_4} (\omega_{10} - \omega_{30}) + \omega_{30} \Leftrightarrow \omega_{40} = \frac{Z_1 Z_{22}}{Z_{21} Z_4} \omega_{10} + \left(1 - \frac{Z_1 Z_{22}}{Z_{21} Z_4}\right) \omega_{30}.$$

**Question 3** On suppose que  $\omega_{40}$  est bloqué. Exprimer le rapport  $\frac{\omega_{30}}{\omega_{10}}$ .

$$\Leftrightarrow 0 = \frac{Z_1 Z_{22}}{Z_{21} Z_4} \omega_{10} + \left(1 - \frac{Z_1 Z_{22}}{Z_{21} Z_4}\right) \omega_{30} \Leftrightarrow \frac{Z_1 Z_{22}}{Z_{21} Z_4} \omega_{10} = - \left(1 - \frac{Z_1 Z_{22}}{Z_{21} Z_4}\right) \omega_{30} \Leftrightarrow \frac{\omega_{30}}{\omega_{10}} = \frac{\frac{Z_1 Z_{22}}{Z_{21} Z_4}}{\frac{Z_1 Z_{22}}{Z_{21} Z_4} - 1} = \frac{Z_1 Z_{22}}{Z_1 Z_{22} - Z_{21} Z_4}.$$