13.2 Linii lungi în regim sinusoidal.

$$(3)\begin{cases} i(x,t) = I\sqrt{2}\sin(\omega t + \gamma_i) \\ u(x,t) = U\sqrt{2}\sin(\omega t + \gamma_u) \end{cases}$$

$$(4)\begin{cases} \underline{I} = I e^{j\gamma_i} \\ \underline{U} = \underline{U} e^{j\gamma_u} \end{cases}$$

$$\begin{cases} \dfrac{\partial \underline{U}}{\partial x} = R' \cdot \underline{I} + j\omega L' \cdot \underline{I} \\ \dfrac{\partial \underline{I}}{\partial x} = G' U + j\omega C' \cdot \underline{U} \end{cases}$$

$$\frac{\partial^2 U}{\partial x^2} = (R' + j\omega L') \cdot \frac{\partial I}{\partial x}$$

$$\frac{\partial^2 u}{\partial x^2} = (R' + j\omega L')(G' + j\omega C) \cdot \underline{U}$$

Notăm $(R' + j\omega L')(G' + j\omega C') = \gamma^2$ - parametru lineic de propagare.

$$\begin{cases} \dfrac{\partial^2 U}{\partial x^2} - \gamma^2 U = 0 \\ \dfrac{\partial^2 I}{\partial x^2} - \gamma^2 \cdot I = 0. \end{cases}$$

$$\underline{U} = A e^{j\underline{\gamma} x} + B e^{-j\underline{\gamma} x}$$

$$\underline{I} = \frac{\partial U}{\partial \gamma} \cdot \frac{1}{R' + j\omega L'}$$

$$= \frac{\gamma A \cdot e^{j\underline{\gamma} x} - \gamma B e^{-j\underline{\gamma} x}}{R' + j\omega L'}$$

$$\gamma = \sqrt{(R' + j\omega L')(G' + j\omega C')}$$

$$\underline{I} = \sqrt{\frac{G' + j\omega C'}{j\omega L' + R'}} \cdot \left(A e^{j\underline{\gamma} x} - \underline{B} e^{-j\underline{\gamma} x}\right)$$

$$= \frac{1}{\underline{Z}_C} \left(\underline{A} e^{j\underline{\gamma} x} - \underline{B} e^{-j\underline{\gamma} x}\right)$$

impedanța caracteristică complexă