$$\mathcal{P}(z) = \frac{1}{2}\underline{u}\,\underline{i}(z)^* = \frac{1}{2}\left(\underline{u}_+ e^{-\underline{\gamma} z} + \underline{u}_- e^{+\underline{\gamma} z}\right) Y_c \left(\underline{u}_+^* e^{-\underline{\gamma}^* z} - \underline{u}_-^* e^{+\underline{\gamma}^* z}\right)$$

$$= \frac{Y_c}{2}\left[\left(\underline{u}_+\underline{u}_+^*\right) e^{-(\underline{\gamma}+\underline{\gamma}^*)z} - \underline{u}_+\underline{u}_-^* e^{(\underline{\gamma}^*-\underline{\gamma})z} + \underline{u}_-\underline{u}_+^* e^{(\underline{\gamma}-\underline{\gamma}^*)z} - \left(\underline{u}_-\underline{u}_-^*\right) e^{(\underline{\gamma}+\underline{\gamma}^*)z}\right]$$

$\underline{u}_+\underline{u}_+^* = |u_+|^2$; $(\underline{u}_-\underline{u}_-^*) = |\underline{u}_-|^2$; $\underline{\gamma}-\underline{\gamma}^* = 2j\,\mathrm{Im}(\underline{\gamma}) = 2j\beta$

$\underline{\gamma}+\underline{\gamma}^* = 2\,\mathcal{R}e(\underline{\gamma}) = 2\alpha$

d'où $\mathcal{P}(z) = \frac{Y_c}{2}\left[|u_+|^2 e^{-2\alpha z} - |u_-|^2 e^{2\alpha z}\right] + 2j\,\mathrm{Im}\left(u_- u_+^* e^{2j\beta z}\right)$