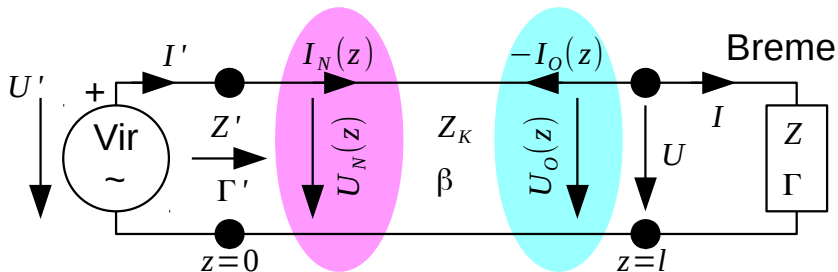**Napredujoči val**

Odbiti val
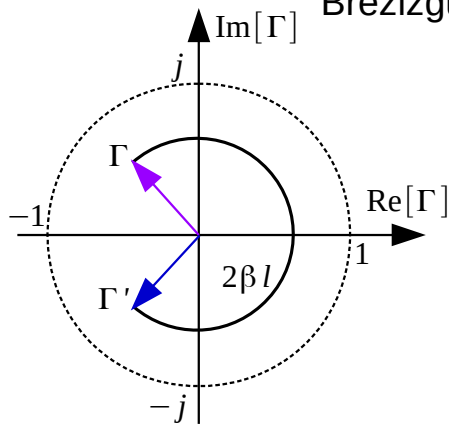
Breme

Brezizgubni vod

$$U_N(z) = U_N(0) \cdot e^{-j\beta z}$$

$$U_O(z) = U_O(0) \cdot e^{+j\beta z}$$

$$\frac{U_N}{I_N} = \frac{-U_O}{I_O} = Z_K = \sqrt{\frac{L/l}{C/l}}$$

Pasivno breme

$$\text{Re}[Z] = R \geq 0$$

$$|\Gamma| \leq 1$$

$$\Gamma = \frac{Z - Z_K}{Z + Z_K} = \frac{Y_K - Y}{Y_K + Y} = \frac{U_O(l)}{U_N(l)}$$

$$\Gamma' = \frac{U_O(0)}{U_N(0)} = \Gamma \cdot e^{-j2\beta l}$$

$$Z' = Z_K \cdot \frac{1 + \Gamma'}{1 - \Gamma'}$$

$$Z' = Z_K \cdot \frac{1 + \frac{Z - Z_K}{Z + Z_K} \cdot e^{-j2\beta l}}{1 - \frac{Z - Z_K}{Z + Z_K} \cdot e^{-j2\beta l}} = Z_K \cdot \frac{Z \cos(\beta l) + j Z_K \sin(\beta l)}{Z_K \cos(\beta l) + j Z \sin(\beta l)}$$

Smith-ov diagram