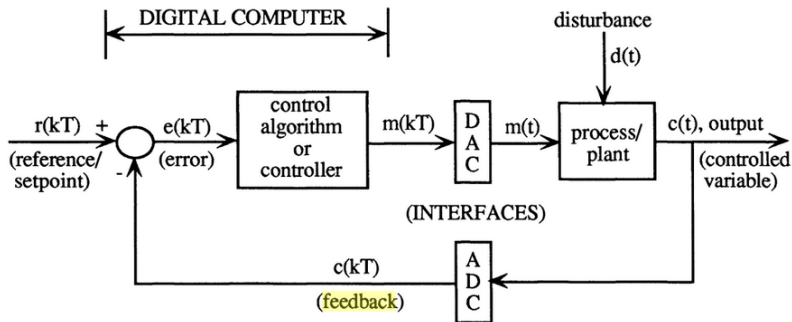


Sistemas de controle digital

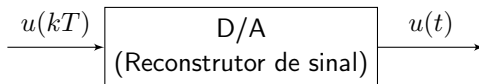
Prof. Rodrigo A. Romano

Escola de Engenharia Mauá

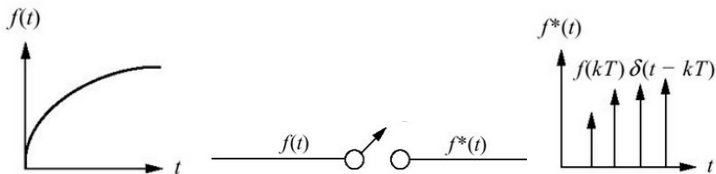
Malha de controle de digital



Conversor digital-analógico (D/A)



Conversor analógico-digital (amostrador)



Amostrador ideal:

$$f^*(t) = f(t) \cdot s(t),$$

onde

$$s(t) = \sum_{k=-\infty}^{\infty} \delta(t - kT).$$

Análise frequencial da amostragem

Sinal amostrado

$$f^*(t) = f(t) \sum_{k=-\infty}^{\infty} \delta(t - kT).$$

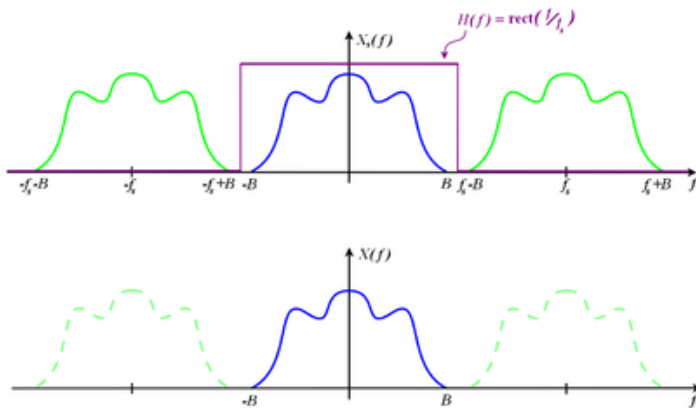
Espectro do sinal amostrado¹

$$F^*(j\omega) = \frac{1}{T} \sum_{k=-\infty}^{\infty} F(j\omega - j\omega_A k).$$

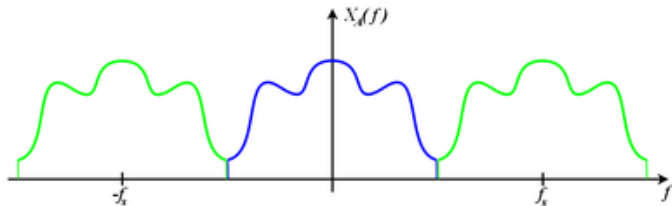
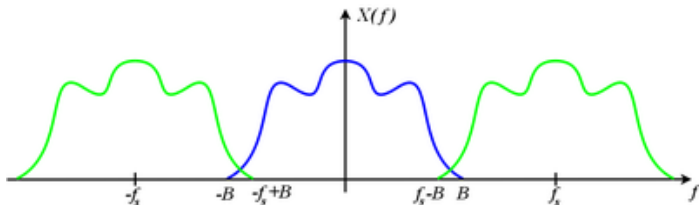
O espectro de um sinal amostrado consiste em repetidas cópias de $F(j\omega)$, deslocadas de múltiplos inteiros da frequência de amostragem ω_A .

¹Dedução na pág.385 de P. L. Castrucci, et al., Controle Automático, LTC (2011).

Reconstrução do sinal



Falseamento ("aliasing") do sinal



Wagon wheel effect

Wagon wheel effect: <https://youtu.be/VNftf5qLpiA>

