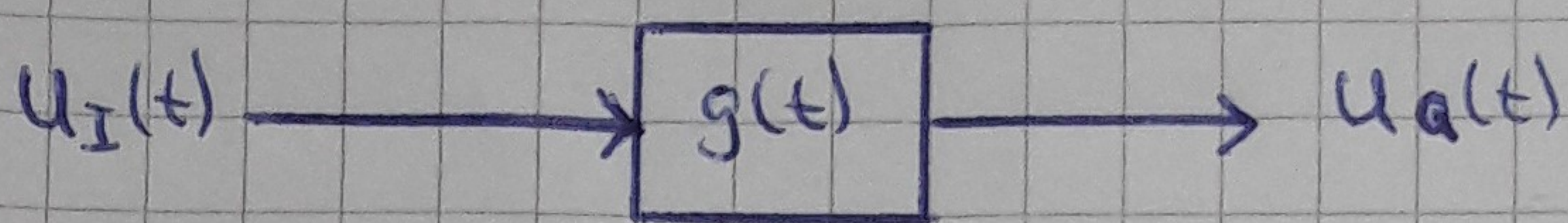


Importance of the Dirac-impuls for the characterization of LTI-Systems

LTI-Systems (Linear time invariant)



$u_a(t) = u_I(t) * g(t)$ (Convolution)

$U_a(f) = U_I(f) \cdot G(f)$ (multiplication, transfer function)

Linearity

→ Linear map between the input and the output

$$u_I(t) = k_1 \cdot u_{I_1}(t) + k_2 \cdot u_{I_2}(t) \Rightarrow u_a(t) = k_1 \cdot u_{a_1}(t) + k_2 \cdot u_{a_2}(t)$$

Time invariance

$$u_I(t - t_0) \Rightarrow u_a(t - t_0)$$

⇒ Delay of the input signal causes an identical delay of the output signal

Reference to the topic

• The Dirac-impuls is very important for the impulse response and the characterization of a LTI-System

$$G(f) = \frac{U_a(f)}{U_I(f)} \Rightarrow G(f) = U_a(f)$$

$U_I(f) = 1$ if input is a dirac impuls