

**Definition** (Discrete-time linear systems). A discrete-time linear time-invariant proper open system is defined by three matrices  $A, B, C$ . Together they give a recurrence of the type

$$\begin{aligned}x_{k+1} &= \mathbf{A}x_k + \mathbf{B}u_k \\y_k &= \mathbf{C}x_k\end{aligned}$$

If  $x$  has dimension  $n \geq 1$ ,  $u$  dimension  $m \geq 1$  and  $y$  dimension  $p \geq 1$ , then  $A$  has dimension  $n \times n$ ,  $B$  has dimension  $n \times m$ ,  $C$  has dimension  $p \times n$ .