

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

$$\begin{aligned}\mathbf{x}_{k+1} &= \mathbf{A}\mathbf{x}_k + \mathbf{B}\mathbf{u}_k, \\ \mathbf{y}_k &= \mathbf{C}\mathbf{x}_k.\end{aligned}$$

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