



**Definition**

A *continuous-time time-invariant linear dynamical system* is a tuple  $(A, B, C, D)$  where  $A \in \mathbf{R}^{n \times n}$ ,  $B \in \mathbf{R}^{n \times m}$ ,  $C \in \mathbf{R}^{k \times n}$  and  $D \in \mathbf{R}^{k \times m}$ . Given an *input*  $u : \mathbf{R} \rightarrow \mathbf{R}^m$ , it models a *state*  $x : \mathbf{R} \rightarrow \mathbf{R}^n$  and *output*  $y : \mathbf{R} \rightarrow \mathbf{R}^k$  by

$$\begin{aligned}\dot{x} &= Ax + Bu, \\ y &= Cx + Du.\end{aligned}$$

Here  $Ax$  is called the *drift term* and  $Bu$  is called the input term (of  $\dot{x}$ ).



