

Observer Canonical Form

A single-output state-space model

$$\dot{x} = Ax + Bu, \quad y = Cx$$

is said to be in **Observer Canonical Form** (OCF) if the matrices A, C are of the form

$$A = \begin{pmatrix} 0 & 0 & \dots & 0 & 0 & * \\ 1 & 0 & \dots & 0 & 0 & * \\ \vdots & \vdots & \ddots & \vdots & \vdots & \vdots \\ 0 & 0 & \dots & 1 & 0 & * \\ 0 & 0 & \dots & 0 & 1 & * \end{pmatrix}, \quad C = (0 \ 0 \ \dots \ 0 \ 1)$$

Fact: A system in OCF is *always observable!*

(The proof of this for $n > 2$ uses the Jordan canonical form, we will not worry about this.)