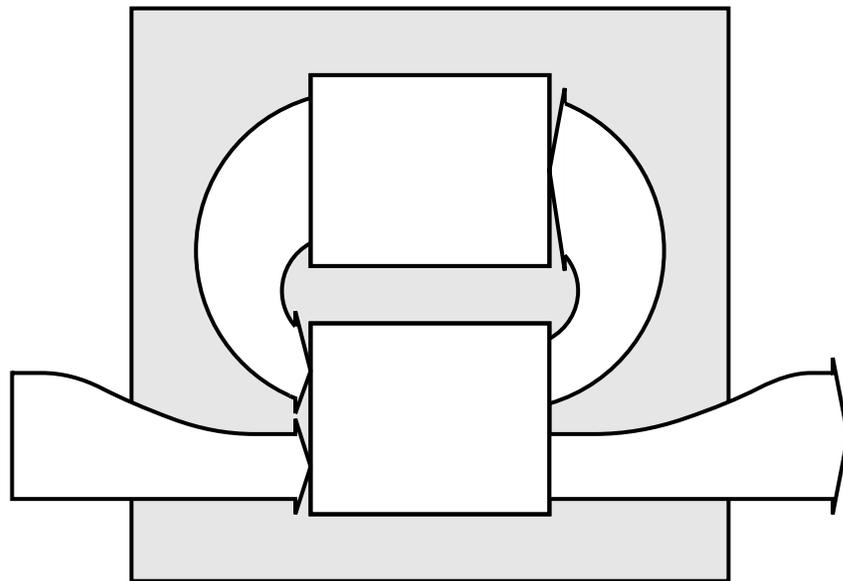


# The Essentials of Linear State-Space Systems

## *Errata*

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An explanation and general *mea culpa*

One is never finished writing a textbook, but it is possible to reach a point where one can stop. I reached such a point with this book, but without fail I can pick it up and find places where things could have been said more simply, clearly, or occasionally, correctly. I have a list of formatting changes, changes that would add to clarity, and typos that are not included here, but if a particular part of the book should be modified, I'd like to hear from you.

In addition to the above minor changes, there are some *errors*, for which corrections can be made available thanks to the web. These changes are also easy to make in subsequent printings of the book.

## Errata, second printing

**p. 22** The second partial derivative in the second row of partial derivatives should be  $\left. \frac{\partial f_A}{\partial x_3} \right|_o = g/\ell$

**p. 59** In Equation (3.4) the index in the rightmost term should be  $k$ , not  $t$ .

**p. 183** The line below the first equation should read . . .  $[\mathbf{S}_1, \mathbf{S}_2]$  gives

## Errata, first printing, corrected in later printings

**pp. 30–33,  
131, 218** The references to Equation (2.4) should be to Equation (2.3).

**p. 59** The dummy variable  $t$  should be  $k$  in (3.4).

**p. 70** In  $\mathcal{S}_2$  the  $\mathbf{D}$  matrix should be  $\mathbf{D} = [0, 0]$  (or note the convention about *zero matrices* given later on p. 106).

**p. 72** In Problem 8 the matrices should be:

$$\mathbf{A} = \begin{bmatrix} 11 & 1 & 0 \\ 7 & 0 & 1 \\ -4 & 0 & 0 \end{bmatrix}, \quad \mathbf{B} = \begin{bmatrix} -2 \\ 3 \\ 1 \end{bmatrix}, \quad \mathbf{C} = [1, 0, 0], \quad \mathbf{D} = 0.$$

**p. 83** On the right-hand side of Equation (4.24),  $x$  should have a subscript:  $a_i x_i(t)$ .

## 2 Errata

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**p. 261** The  $(1, 3)$  entry  $1/C_1$  in the first row of the coefficient matrix should be  $-1/C_1$ .

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**p. 262** The caption of Figure S4.1(b) should read, "The second linear circuit with tree."

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**p. 275** The column matrix in the matrix product in the third line of Problem 9 should be  $\begin{bmatrix} \cos \phi \\ \sin \phi \end{bmatrix}$ .

Since state space descriptions are not unique representations of a dynamical system, they allow the designer to find an implementation that fits best to the requirements imposed, e.g. coefficients that are readily implemented, a prescribed circuit topology, or maximum dynamic range. The description is transformed into the desired form by state space transforms or similarity transforms. The rank properties necessary and sufficient for a singular pencil model of linear systems to be minimal are derived, using the Kronecker canonical decomposition. A stable numerical algorithm for minimization is included. [Read more.](#)