

ACKNOWLEDGMENTS

One of the original reviewers of this article observed that the subject of this paper is contained in modern control theory texts. It is a pleasure to suggest to students that *Linear Systems* by Thomas Kailath (Prentice-Hall 1980) is an excellent reference with good examples and exercises. The most directly relevant part is section 9.1 pp 598-606 and example 9.1-3 p. 605, but there are many other items of interest throughout the entire text.

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NOMENCLATURE

		Determinant
[]	Matrix (square)
()	Vector (column)
()'	Transposed vector (row)
z		Length of plug flow reactor
x		Extent of reaction
V		Vector of reaction rates
y		Perturbation in x
T		Temperature
M		Objective function to be optimized
m		Number of independent chemical reactions
B		Coefficient matrix from partial derivatives of rates V
Y		Matrix of homogeneous solutions to Eq. 4a
I		Identity matrix
c		Vector of particular solutions for Eq. 4a
u'		Row vector ($\partial M / \partial x_{ie}$)'
w		Column vector ($\partial V_i / \partial T$) \bar{T}
λ		Vector of adjoint variables

Subscripts

o	Entrance to reactor
e	Exit from reactor
i,j,k	Row column indexes

Superscripts

i	Index to independent chemical reactions (1 to m)
.	Differentiation with respect to length
-1	Inverse matrix
'	Transpose
—	Indicates perturbation value