



MITx CSE.0002x

Introduction to Computational Science and Engineering




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10.1.2 Canonical form for a linear system IVP

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Recall the canonical form of an IVP as given in Equation (8.36)

$$\frac{d\underline{u}}{dt} = \underline{f}(\underline{u}, t)$$

(10.1)

For the case of a linear system, \underline{f} will be a purely linear function of \underline{u} and so can be written in the following form:

$$\underline{f}(\underline{u}, t) = \underline{A}\underline{u} + \underline{b}(t)$$

(10.2)

where \underline{A} is an $M \times M$ matrix and for the purposes of this class, we will assume \underline{A} does not depend on time. The length M vector $\underline{b}(t)$ is a function of time, but not \underline{u} . The governing system of differential equations for this case can then be written as:

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