

EE6302 Control System Design

Unit 2: Dynamic Model and the Transfer Function of a System

2.2 State variable form of a system

As we discussed before model of the system is represented by a set of differential equations. These differential equations we can put into two matrix equations as in the following.

X - State vector (column vector) of the system

\dot{Y} - Derivative of the state of the system.

A - System matrix

B - Input matrix

C - Output matrix

D - Direct transmission matrix.

U - Input to the system

Y - Output to the system

When the system is represented by the above 1 & 2 matrix equation, we called it is the state variable form of the system.

Example

Consider the cruise control system discussed before. Express the system in state variable form where the output is the car position, x.

We define the position and the velocity of the car as the state of the system.