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Civil Engineering

a. Define a dynamic equation

This refers to a differential equation in continuous time. It is an equation that depicts changes in a variable / function with respect to time scale.

b. An engineering system is described by the equation

1. Develop a dynamic model in form of an ordinary differential equation for the system.

Equation 1, $y = Ate^t$

Solution

$$y = Ate^t$$

$$A = \frac{y}{te^t} \dots \dots \dots (2)$$

$$\frac{dy}{dt} = Ae^t + Ate^t$$

$$\frac{dy}{dt} = Ae^t + y$$

$$\frac{dy}{dt} = \left(\frac{y}{te^t} \right) e^t + y$$

$$\frac{dy}{dt} = \frac{y}{t} + y$$

$$\frac{dy}{dt} (t) = y + y \frac{1}{t}$$

$$t \frac{dy}{dx} - (1+t)y = 0$$