6.003: Signals and Systems

Convolution

October 15, 2009

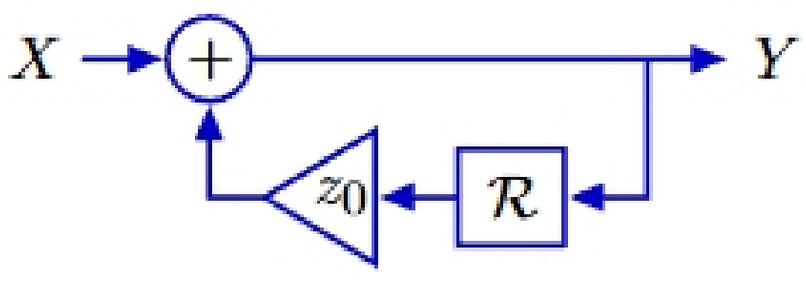
Multiple Representations of CT and DT Systems

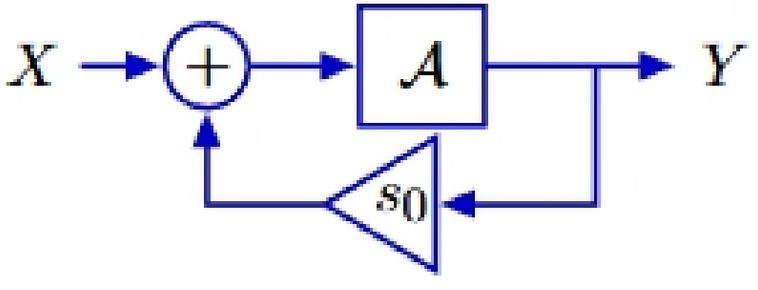
Verbal descriptions: preserve the rationale.

Difference/differential equations: mathematically compact.

$$y[n] = x[n] + z_0\, y[n-1] \qquad \dot{y}(t) = x(t) + s_0\, y(t)$$

Block diagrams: illustrate signal flow paths.





Operator representations: analyze systems as polynomials.

$$\frac{Y}{X} = \frac{1}{1 - z_0\mathcal{R}} \qquad \frac{Y}{X} = \frac{\mathcal{A}}{1 - s_0\mathcal{A}}$$

Transforms: representing diff. equations with algebraic equations.

$$H(z) = \frac{z}{z - z_0} \qquad H(s) = \frac{1}{s - s_0}$$

Convolution

Representing a system by a single signal.