

Fall 2019

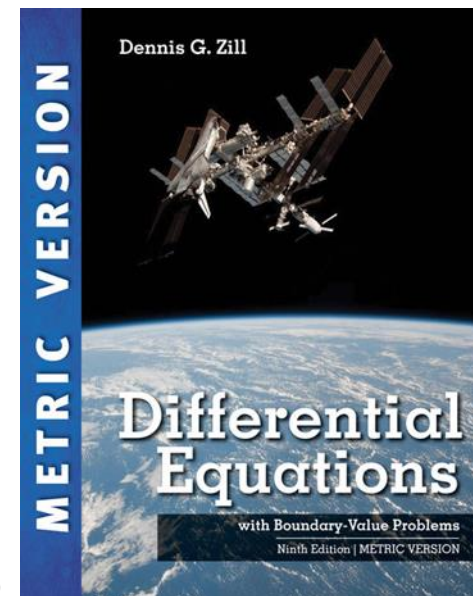
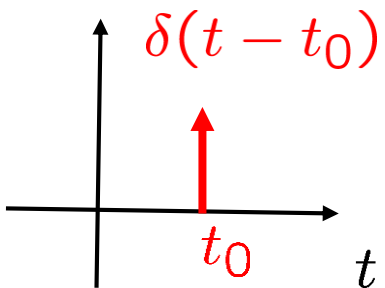
微分方程 Differential Equations

Unit 07.5 The Dirac Delta Function

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Sep19 – Jan20



- 7.1: Definition of Laplace Transform
- 7.2: Inverse Transforms and Transforms of Derivatives
 - 7.2.1: Inverse Transforms
 - 7.2.2: Transforms of Derivatives
- 7.3: Operational Properties I
 - 7.3.1: Translation on the s -Axis
 - 7.3.2: Translation on the t -Axis
- 7.4: Operational Properties II
 - 7.4.1: Derivatives of a Transform
 - 7.4.2: Transforms of Integrals
 - 7.4.3: Transform of a Periodic Function
- **7.5: The Dirac Delta Function**
- 7.6: Systems of Linear Differential Equations

- Unit Impulse:

$$\delta_a(t - t_0) = \begin{cases} 1 & , & \leq t < \\ 0 & , & \end{cases}$$



$$\Rightarrow \int_0^{\infty} \delta_a(t - t_0) dt =$$

- Dirac Delta Function:

$$\delta(t - t_0) = \delta_a(t - t_0)$$

$$\Rightarrow \delta(t - t_0) = \begin{cases} \infty, & t = t_0 \\ 0, & t \neq t_0 \end{cases}$$



$$\Rightarrow \int_0^{\infty} \delta(t - t_0) dt =$$

$$\Rightarrow \mathcal{L} \left\{ \delta_a(t - t_0) \right\} = ?$$

$$\delta_a(t - t_0) =$$

$$\Rightarrow \mathcal{L} \left\{ \delta_a(t - t_0) \right\} =$$

$$=$$

$$\Rightarrow \lim_{a \rightarrow 0} \mathcal{L} \left\{ \delta_a(t - t_0) \right\} =$$

$$=$$

$$\Rightarrow \mathcal{L} \left\{ \delta(t - t_0) \right\} =$$

$$\Rightarrow \mathcal{L} \left\{ \mathcal{U}(t) \right\} =$$

$$\Rightarrow \mathcal{L} \left\{ \frac{d}{dt} \mathcal{U}(t) \right\} =$$

$$\Rightarrow \mathcal{L} \left\{ \delta(t) \right\} =$$

$$\Rightarrow \quad \delta(t) \quad \frac{d}{dt} \mathcal{U}(t)$$

