

rechnung_betragundphase_umkehrintegrator

Student Group

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Table of Contents

$\hat{U}_A = -\frac{1}{R \cdot C} \int \hat{U}_E(t) dt + U_{A0}$	insert sine function	$\hat{U}_E(t) = \hat{U}_E \sin(\omega \cdot t)$	
$\hat{U}_A = -\frac{1}{R \cdot C} \int \hat{U}_E \sin(\omega \cdot t) dt + U_{A0}$	insert root function with limits	$\int \sin(a \cdot x) dx = -\frac{1}{a} \cos(a \cdot x)$	
$\hat{U}_A = -\frac{1}{R \cdot C} \left[-\frac{\hat{U}_E}{\omega} \cos(\omega \cdot t) \right]_0^1 + U_{A0}$	put constant before integral		
$\hat{U}_A = \frac{\hat{U}_E}{\omega R C} \cos(\omega \cdot t) + U_{A0}$	insert limits	$t_0=0, t_1=t$	
$\hat{U}_A = \frac{\hat{U}_E}{\omega R C} \cos(\omega \cdot t) + U_{A0}$			
$\hat{U}_A = \frac{\hat{U}_E}{\omega R C} \cos(\omega \cdot t) + U_{A0}$		$\cos(0) = 1$	
$\hat{U}_A = \frac{\hat{U}_E}{\omega R C} \cos(\omega \cdot t) + U_{A0}$	multiply		
$\hat{U}_A = \frac{\hat{U}_E}{\omega R C} \cos(\omega \cdot t) + U_{A0}$			
$\hat{U}_A = \frac{\hat{U}_E}{\omega R C} \cos(\omega \cdot t) + U_{A0}$	consider the non-cosine terms		
$\hat{U}_A = \frac{\hat{U}_E}{\omega R C} \cos(\omega \cdot t) + U_{A0}$	This part is independent in time. Since we assume purely sinusoidal quantities, the for the initial voltage of the capacitor must be: $U_{A0} = \frac{\hat{U}_E}{\omega R C}$		
$\hat{U}_A = \frac{\hat{U}_E}{\omega R C} \cos(\omega \cdot t) + U_{A0}$			
$\hat{U}_A = \frac{\hat{U}_E}{\omega R C} \cos(\omega \cdot t) + U_{A0}$			

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