rechnung_umkehrintegrator

Student Group

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Table of Contents

	$U_A = f(U_E)$
	with III.
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$	
$U_A=\color{blue}{-U_D}-U_C$	
with II. and I.:$ \color{blue}{U_D} = { 1 \over A_D } \cdot U_A \overset{A_D -> \infty}\longrightarrow 0$	
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$	
$U_A= \quad 0 \quad -\color{blue}{U_C}$	
with V.: $\color{blue}{U_C}={ 1 \over C }\cdot(\int_{t_0}^{t_1} I_C \ dt+ Q_0(t_0))$	
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$	
$U_A = {-{ 1 \over C }\cdot}(\int_{t_0}^{t_1} \color{blue}{I_C} \ dt+ Q_0(t_0)) $	
with IV.: $\color{blue}{I_C}=I_R$	
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$	
$U_A = \color{blue}{-{ 1 \over C }\cdot(}\int_{t_0}^{t_1} I_R \ dt+ Q_0(t_0)\color{blue}{)} $	
Factor out	
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$	
$U_A = -{ 1 \over C }\cdot\int_{t_0}^{t_1} I_R \ dt - \color{blue}{ Q_0(t_0) \over C } $	
consider the integration constant: $\color{blue}{ Q_0(t_0) \over C }= U_C(t_0) = -U_{A0}$	
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$	
$U_A = -{ 1 \over C }\cdot\int_{t_0}^{t_1} \color{blue}{I_R} \ dt + U_{A0}$	
with VI. and II.: $\color{blue}{I_R}={ U_R \over R}={ U_E \over R} $	
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$	
$U_A = -{ 1 \over C }\cdot\int_{t_0}^{t_1} \color{blue}{1 \over R} \cdot U_E \ dt + U_{A0}$	
move constant ahead	
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$	
$U_A = -{ 1 \over {R\cdot C} }\cdot\int_{t_0}^{t_1} U_E \ dt + U_{A0}$	
insert time constant $\tau = R \cdot C$	
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$	
$U_A = -{ 1 \over {\tau} }\cdot\int_{t_0}^{t_1} U_E \ dt + U_{A0}$	
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$	