rechnung_umkehrintegrator

Student Group

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$\;$ $\;$	$U\_A = f(U\_E)$
$\;$ $\;$	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 } $
$\;$ $\;$	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 $\tau = R \cdot C$
	$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$
$\;$ $\;$	$U\_A = -{ 1 \over {\tau} }\cdot\int\_{t\_0}^{t\_1} U\_E \ dt + U\_{A0}$
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