

rechnung_umkehrintegrator

Student Group

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