

rechnung_umkehrintegrator

Student Group

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\$\;\$ \$\;\$	$\$U_{\rm O} = f(U_{\rm I})\$$
\$\;\$ \$\;\$	with III.
	$\$ \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \$$
\$\;\$ \$\;\$	$\$U_{\rm O}=\color{blue}\{-U_{\rm D}\}-U_C\$$
\$\;\$ \$\;\$	with II. and I.: $\color{blue}\{U_{\rm D}\} = \{1 \over A_D\} \cdot U_{\rm O} \overset{A_D ->}{\infty} \longrightarrow 0\$$
	$\$ \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \$$
\$\;\$ \$\;\$	$\$U_{\rm O}= \quad 0 \quad -\color{blue}\{U_C\}\$$
\$\;\$ \$\;\$	with V.: $\color{blue}\{U_C\}=\{1 \over C\} \cdot (\int_{t_0}^{t_1} I_C \setminus {\rm d} t + Q_0(t_0))\$$
	$\$ \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \$$
\$\;\$ \$\;\$	$\$U_{\rm O} = \{-1 \over C\} \cdot (\int_{t_0}^{t_1} \color{blue}\{I_C\} \setminus {\rm d} t + Q_0(t_0)) \$$
\$\;\$ \$\;\$	with IV.: $\color{blue}\{I_C\}=I_R\$$
	$\$ \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \$$
\$\;\$ \$\;\$	$\$U_{\rm O} = \color{blue}\{-1 \over C\} \cdot (\int_{t_0}^{t_1} I_R \setminus {\rm d} t + Q_0(t_0)\color{blue}\{\}) \$$
\$\;\$ \$\;\$	Factor out
	$\$ \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \$$
\$\;\$ \$\;\$	$\$U_{\rm O} = -\{1 \over C\} \cdot \int_{t_0}^{t_1} I_R \setminus {\rm d} t - \color{blue}\{Q_0(t_0) \over C\} \$$
\$\;\$ \$\;\$	integration constant: $\color{blue}\{Q_0(t_0) \over C\}=U_C(t_0)=-U_{\rm OO}\$$
	$\$ \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \$$
\$\;\$ \$\;\$	$\$U_{\rm O} = -\{1 \over C\} \cdot \int_{t_0}^{t_1} \color{blue}\{I_R\} \setminus {\rm d} t + U_{\rm OO}\$$
\$\;\$ \$\;\$	with VI. and II.: $\color{blue}\{I_R\}=\{U_R \over R\}=\{U_{\rm I} \over R\} \$$
	$\$ \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \$$
\$\;\$ \$\;\$	$\$U_{\rm O} = -\{1 \over C\} \cdot \int_{t_0}^{t_1} \color{blue}\{1 \over R\} \cdot U_{\rm I} \setminus {\rm d} t + U_{\rm OO}\$$
\$\;\$ \$\;\$	move constant ahead
	$\$ \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \$$
\$\;\$ \$\;\$	$\$U_{\rm O} = -\{1 \over {R \cdot C}\} \cdot \int_{t_0}^{t_1} U_{\rm I} \setminus {\rm d} t + U_{\rm OO}\$$
\$\;\$ \$\;\$	insert time constant $\tau = R \cdot C\$$
	$\$ \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \$$
\$\;\$ \$\;\$	$\$U_{\rm O} = -\{1 \over \tau\} \cdot \int_{t_0}^{t_1} U_{\rm I} \setminus {\rm d} t + U_{\rm OO}\$$
\$\;\$ \$\;\$	

$$\begin{array}{c} \text{\textit{a}} \\ \text{\textit{b}} \\ \text{\textit{c}} \\ \text{\textit{d}} \\ \text{\textit{e}} \\ \text{\textit{f}} \\ \text{\textit{g}} \\ \text{\textit{h}} \\ \text{\textit{i}} \\ \text{\textit{j}} \\ \text{\textit{k}} \\ \text{\textit{l}} \\ \text{\textit{m}} \\ \text{\textit{n}} \\ \text{\textit{o}} \\ \text{\textit{p}} \\ \text{\textit{q}} \\ \text{\textit{r}} \\ \text{\textit{s}} \\ \text{\textit{t}} \\ \text{\textit{u}} \\ \text{\textit{v}} \\ \text{\textit{w}} \\ \text{\textit{x}} \\ \text{\textit{y}} \\ \text{\textit{z}} \end{array}$$

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