

rechnung_betragundphase_umkehrintegrator

Student Group

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\$\;\$ \$\;\$ \$\;\$	$U_A = -\{ 1 \over {R \cdot C} \} \cdot \int_{t_0}^{t_1} \textcolor{blue}{U_E(t)} \, dt + U_{A0}$
\$\;\$ \$\;\$ \$\;\$	insert sine function: $\textcolor{blue}{U_E(t)} = \hat{U}_E \cdot \sin(\omega \cdot t)$
\$\;\$ \$\;\$ \$\;\$	$\textcolor{blue}{U_A} = -\{ 1 \over {R \cdot C} \} \cdot \int_{t_0}^{t_1} \hat{U}_E \cdot \sin(\omega \cdot t) \, dt + U_{A0}$
\$\;\$ \$\;\$ \$\;\$	insert root function with limits $\textcolor{blue}{\int_{x_0}^{x_1} \sin(a \cdot x) \, dx} = [-1 \over a] \cdot \cos(a \cdot x) \Big _{x_0}^{x_1}$
\$\;\$ \$\;\$ \$\;\$	$U_A = -\{ 1 \over {R \cdot C} \} \cdot [-\textcolor{blue}{\hat{U}_E \over \omega} \cdot \cos(\omega \cdot t) \Big _{t_0}^{t_1}] + U_{A0}$
\$\;\$ \$\;\$ \$\;\$	put constant before integral $U_A = \{ \textcolor{blue}{\hat{U}_E \over \omega} \cdot \cos(\omega \cdot t) \Big _{t_0}^{t_1} \} + U_{A0}$
\$\;\$ \$\;\$ \$\;\$	insert limits: $t_0=0$, $t_1=t$ $U_A = \{ \textcolor{blue}{\hat{U}_E \over \omega} \cdot \cos(\omega \cdot t) - \textcolor{blue}{\cos(0)} \} + U_{A0}$
\$\;\$ \$\;\$ \$\;\$	$\textcolor{blue}{\cos(0)} = 1$
\$\;\$ \$\;\$ \$\;\$	$U_A = \{ \textcolor{blue}{\hat{U}_E \over \omega} \cdot \cos(\omega \cdot t) - 1 \textcolor{blue}{\cdot} \} + U_{A0}$
\$\;\$ \$\;\$ \$\;\$	multiply $U_A = \{ \textcolor{blue}{\hat{U}_E \over \omega} \cdot \cos(\omega \cdot t) \textcolor{blue}{-} \{ \textcolor{blue}{\hat{U}_E \over \omega} \} \} + U_{A0}$
\$\;\$ \$\;\$ \$\;\$	consider the non-cosine terms: The blue part is independent in time. We assume purely sinusoidal quantities!
\$\;\$ \$\;\$ \$\;\$	$U_A = \{ \textcolor{blue}{\hat{U}_E \over \omega} \cdot \cos(\omega \cdot t) \textcolor{blue}{-} \{ \textcolor{blue}{\hat{U}_E \over \omega} \} \} + U_{A0}$
\$\;\$ \$\;\$ \$\;\$	$U_{C0} = U_{A0} = \{ \textcolor{blue}{\hat{U}_E \over \omega} \}$
\$\;\$ \$\;\$ \$\;\$	$U_A = \{ \textcolor{blue}{\hat{U}_E \over \omega} \cdot \cos(\omega \cdot t) \}$
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