

## 5.4 Solitonen

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$$\begin{aligned} & \int_{-\infty}^{\infty} \varepsilon_1(t') \bar{E}(\vec{r}, t-t') dt' = \\ &= \int_{-\infty}^{\infty} \varepsilon_1(t') \bar{E}_0 R(\zeta) A(z, t-t') \exp\{i(kz - \omega t)\} \exp\{i\omega t'\} dt' \\ &= \bar{E}_0 R(\zeta) \exp\{i(kz - \omega t)\} \int_{-\infty}^{\infty} \varepsilon_1(t') \left[ A(z, t-t') - t' \dot{A} + \frac{1}{2} t'^2 \ddot{A} \right] \exp\{i\omega t'\} dt' \\ &= \bar{E}_0 R(\zeta) \exp\{i(kz - \omega t)\} \left[ \varepsilon(\omega) A + i\varepsilon'(\omega) \dot{A} - \frac{1}{2} \varepsilon''(\omega) \ddot{A} \right] \end{aligned}$$

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$$A'' + i2kA' + i2kk'\dot{A} - (k'^2 + kk'')\ddot{A} = -\frac{\varepsilon_2}{c^2} \omega^2 \alpha |A|^2 A$$

mit  $k' = \frac{1}{v}$  (ohne Dispersion) und  $\times \frac{1}{2k}$

$$\frac{1}{2k} \left( A'' - \frac{1}{v^2} \ddot{A} \right) = \frac{1}{2} k'' \ddot{A} - i \left( A' + \frac{1}{v} \dot{A} \right) - \frac{\varepsilon_2}{c^2} \omega^2 \alpha |A|^2 A$$

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$$\frac{d}{dx} \left( \frac{1}{\cosh x} \right) = - \frac{\sinh x}{(\cosh x)^2}$$

$$\cosh^2 x - \sinh^2 x = 1$$

$$\frac{d^2}{dx^2} \left( \frac{1}{\cosh x} \right) = \frac{1}{\cosh x} \left[ 1 - \frac{2}{(\cosh x)^2} \right]$$