

## 4.3 Solitonen

$$A' + \frac{1}{v} \dot{A} =$$

$$|A_0| \left[ \frac{1}{\epsilon_0} \frac{\partial B}{\partial t} + \frac{1}{z_0} \frac{\partial B}{\partial \xi} + \frac{1}{v} \frac{1}{t_0} \frac{\partial B}{\partial \tau} \right] = \frac{|A_0|}{z_0} \frac{\partial B}{\partial \xi}$$

$$0 = \frac{1}{2} k'' \frac{1}{t_0} \frac{\partial^2 B}{\partial \tau^2} |A_0| - i \frac{|A_0|}{z_0} \frac{\partial B}{\partial \xi} - \underbrace{\left( \frac{\epsilon_2}{2\epsilon} k \alpha |A_0|^2 \right)}_{\frac{1}{z_0}} \underbrace{\left( \frac{\omega^2 \epsilon}{c^2 k^2} \right)}_{=1} |A_0| \underbrace{(|B|^2 B)}_{}$$

$$0 = \frac{1}{2} \frac{\partial^2 B}{\partial \tau^2} + i \frac{\partial B}{\partial \xi} + |B|^2 B$$

$$\cosh^2 - \sinh x = 1, \quad \frac{d}{dx} \cosh x = \sinh x, \quad \frac{d}{dx} \sinh x = \cosh x$$

$$\frac{d}{dx} \frac{1}{\cosh x} = - \frac{\sinh x}{\cosh^2 x}$$

$$\frac{d^2}{dx^2} \frac{1}{\cosh x} = - \frac{1}{\cosh x} + 2 \frac{\sinh^2 x}{\cosh^3 x} = \frac{1}{\cosh x} \left[ -1 + 2 \frac{\cosh^2 x - 1}{\cosh^2 x} \right] = \frac{1}{\cosh x} \left[ 1 - \frac{2}{\cosh^2 x} \right]$$

$$- \frac{1}{2} q_0^2 B = i \frac{\partial B}{\partial \xi}$$

$$\frac{1}{2} \frac{\partial^2 B}{\partial \tau^2} = \frac{1}{2} \frac{q_0^2}{1} B - q_0^2 \frac{1}{\cosh^2 x} B$$

$$|B|^2 B = q_0^2 \frac{1}{\cosh^2 x} B$$

# 5 Teilchenzahlformalismus

