Reproducing the results in:

Numerical study of soliton emission from a nonlinear Waveguide –
M. A. Gubbels et al,
J. V. Moloney,
1987.

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Geometry

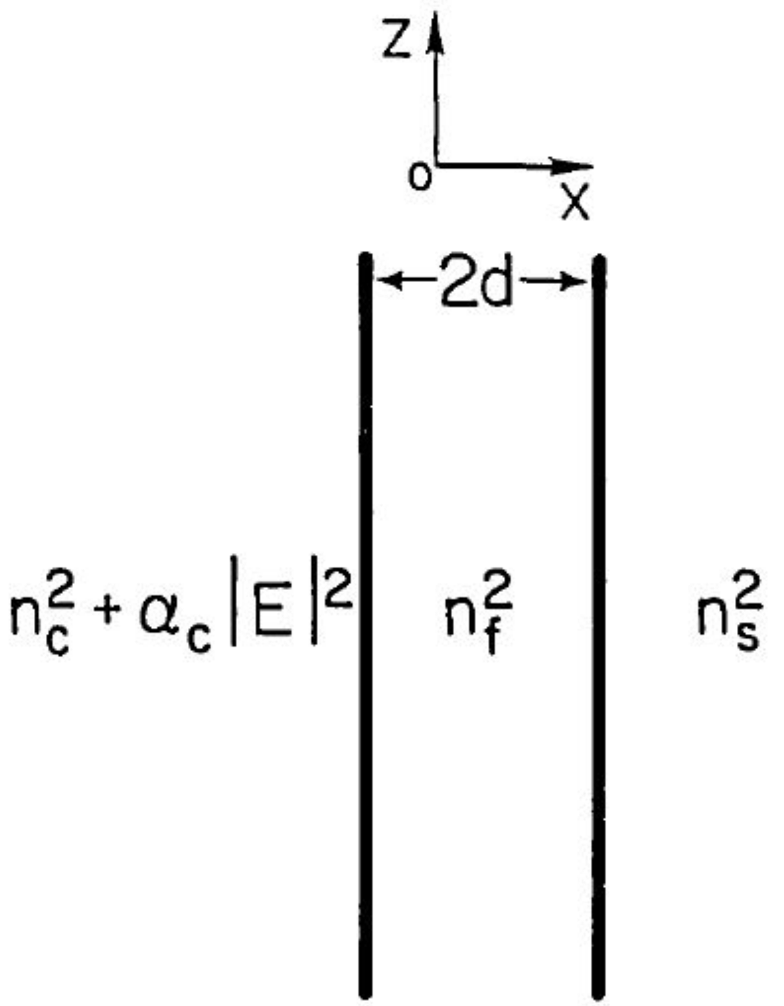


Fig. 1. Nonlinear waveguide geometry. A linear thin film of thickness $2d$ is bounded by a linear substrate and a nonlinear cladding.

Differential equation

$$2i\beta\frac{\partial E}{\partial z}+\frac{\partial^2 E}{\partial x^2}-[\beta^2-n^2(x,|E|^2)]E+i\beta\Gamma(x)E=0$$

where,

$$n^2(x,|E|^2)=n_\gamma{}^2+\frac{\alpha_\gamma|E|^2}{1+\chi|E|^2},\qquad \gamma=c,f,s;$$

Input beam

$$E(x,0) = E_0(x) = \frac{S_{\text{in}}}{w_0}\left(\frac{2}{\pi}\right)^{1/2} \exp\{i[Q(x-x_0)^2/2 + \kappa x]\}.$$

- The differential equation was numerically solved using the beam propagation method (aka SSFM) with 1024 transverse sampling points. And a step size (deltaz) of 0.1.
- The following parameters were held constant throughout the process: n_c = n_s = 1.55, n_f = 1.57, alpha_c = 0.01, alpha_s = alpha_f = 0, w_0 = 10 units.

Soliton emission in the 'ideal' case

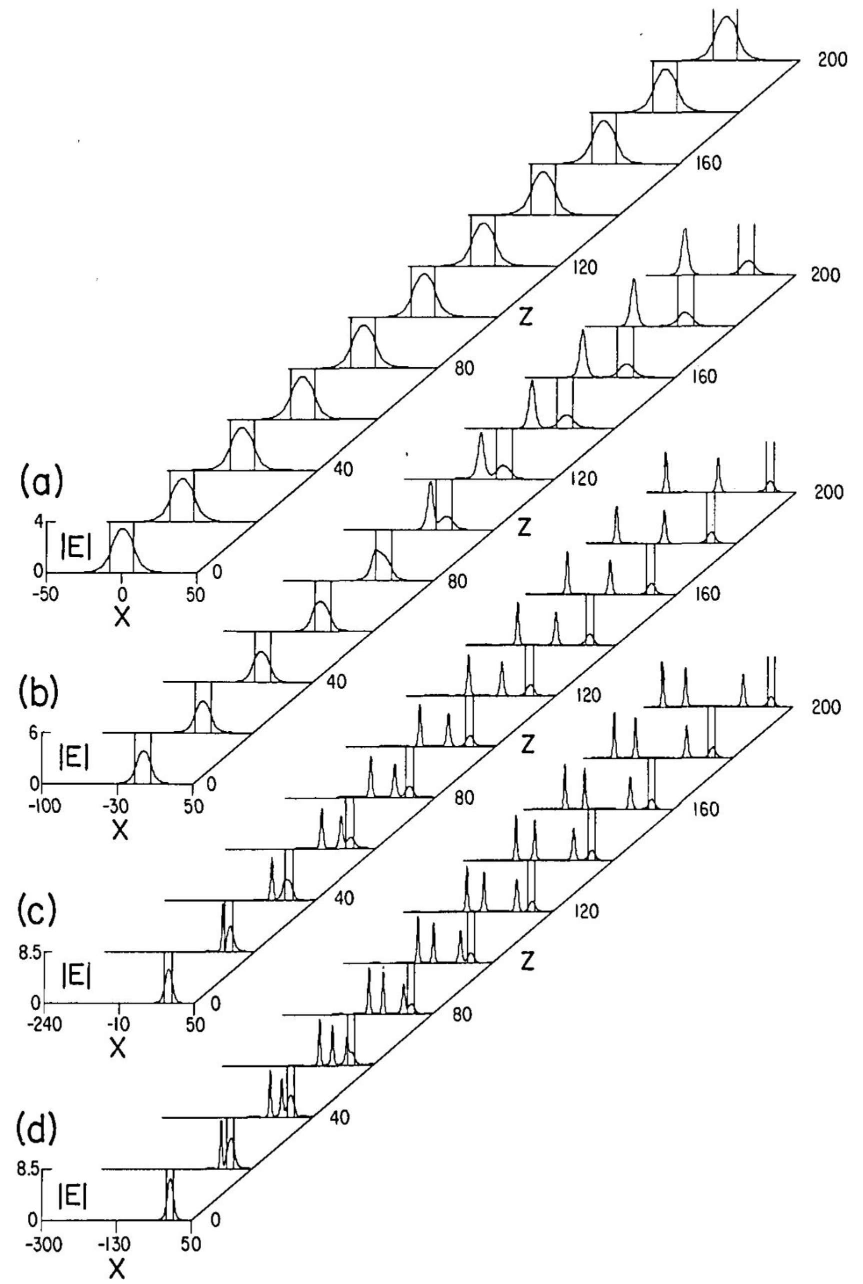
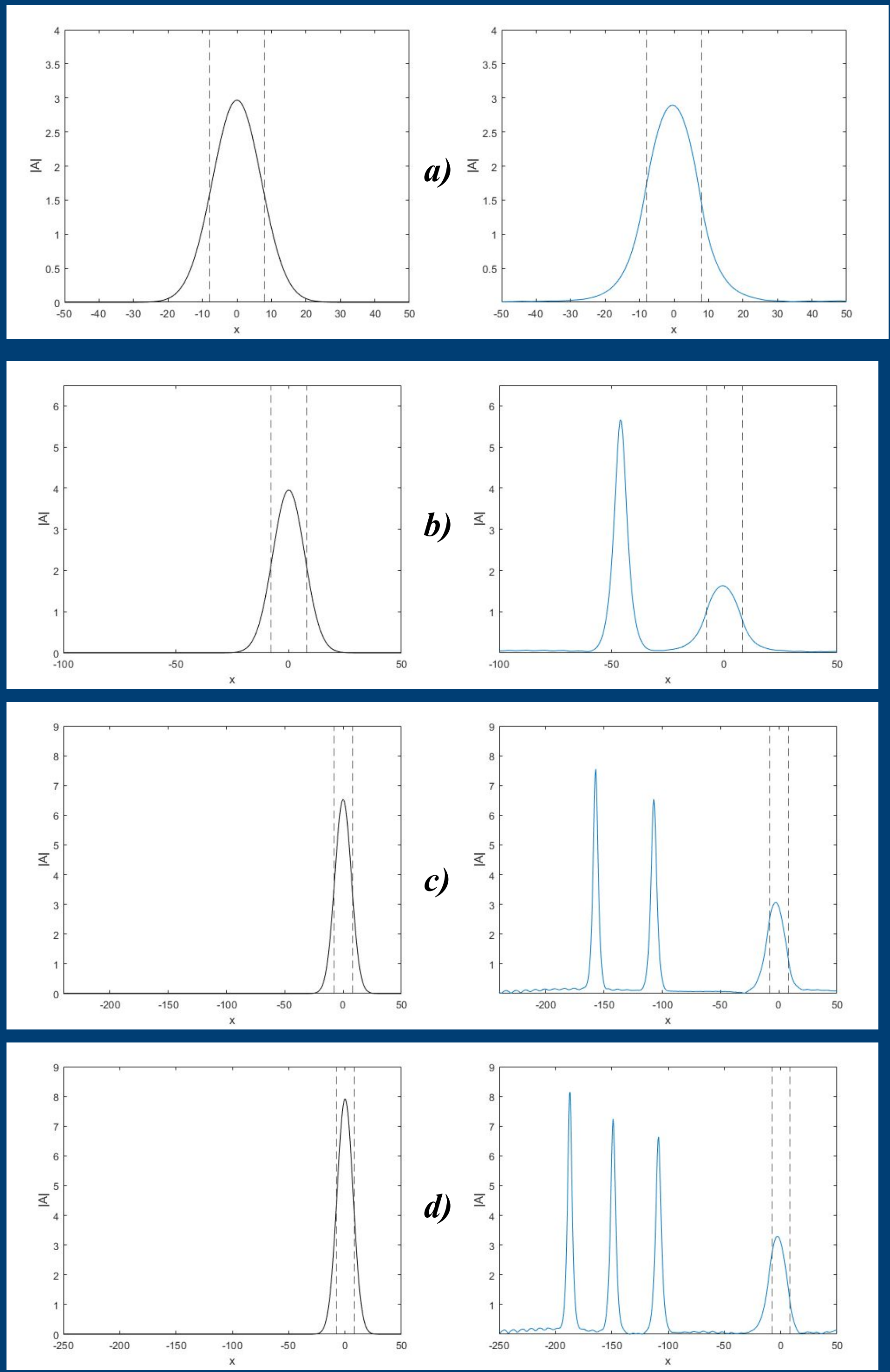


Fig. 3. Multisoliton emission in the ideal case for input flux levels (a) 0.15, (b) 0.2, (c) 0.4, (d) 0.6. In this and all similar figures the vertical lines indicate the waveguide boundaries and the propagation coordinate is in units of free-space wavelengths.



Soliton emission in the presence of linear absorption

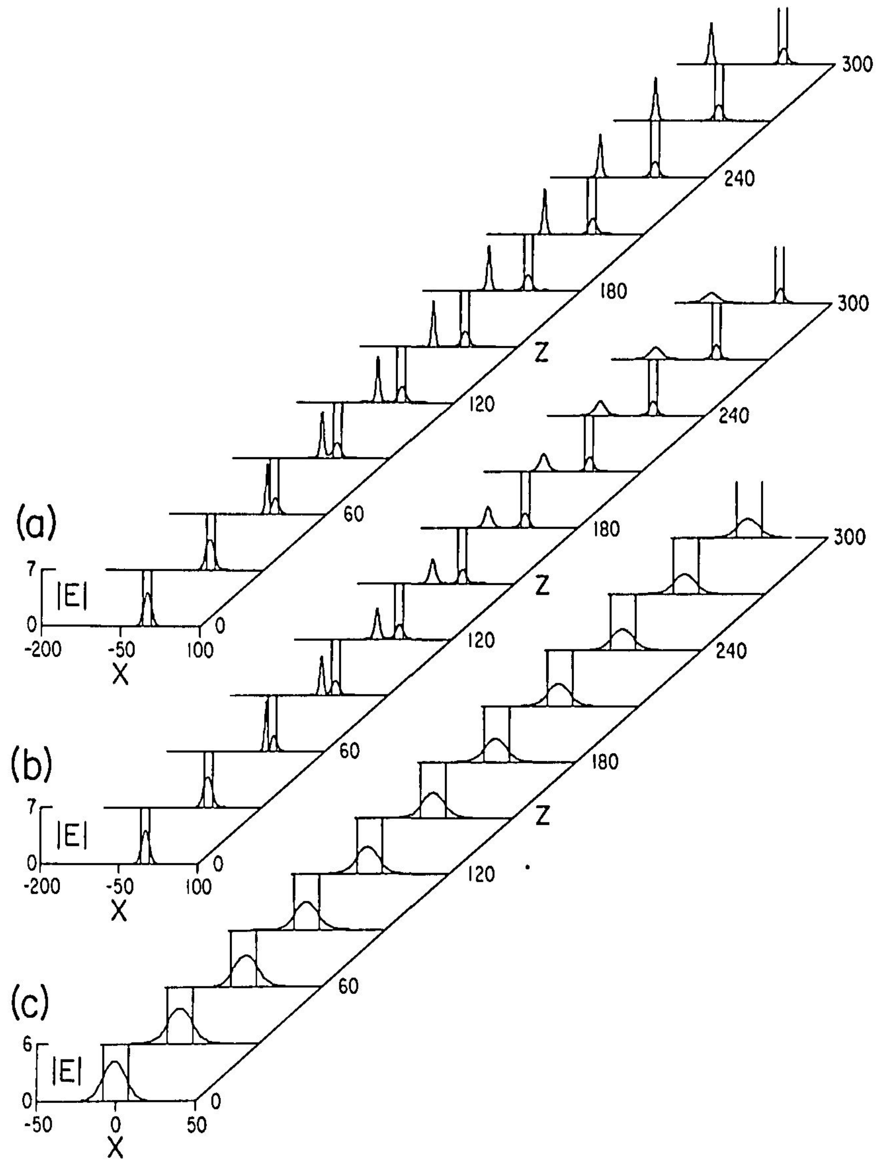
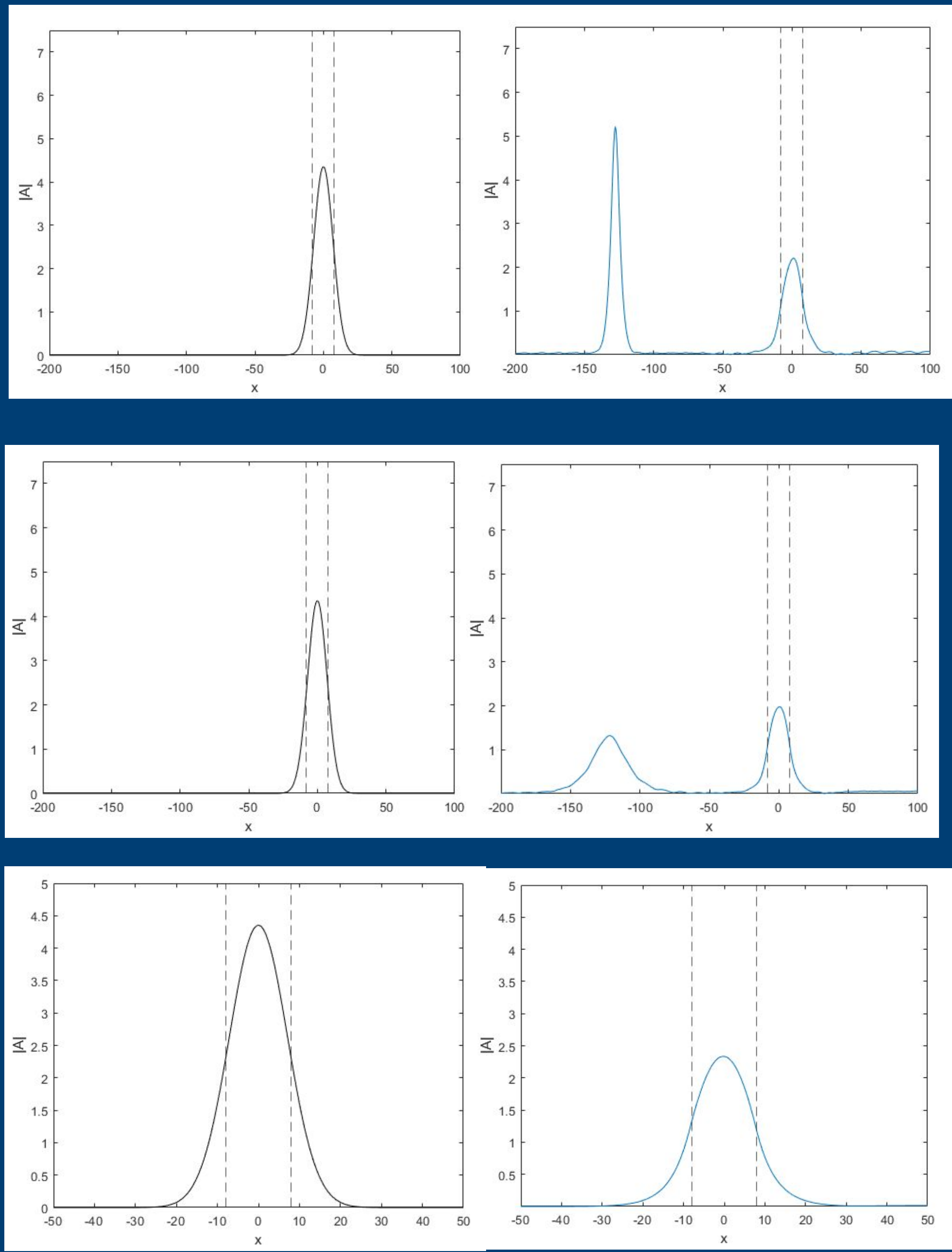


Fig. 4. Soliton emission in the presence of absorption. The input flux in all cases is $S_{\text{in}} = 0.22$; the absorption coefficients Γ_c are (a) 10^{-4}, (b) 10^{-3}, (c) 10^{-2}.



Soliton emission in the presence of input-beam misalignments (transverse displacement)

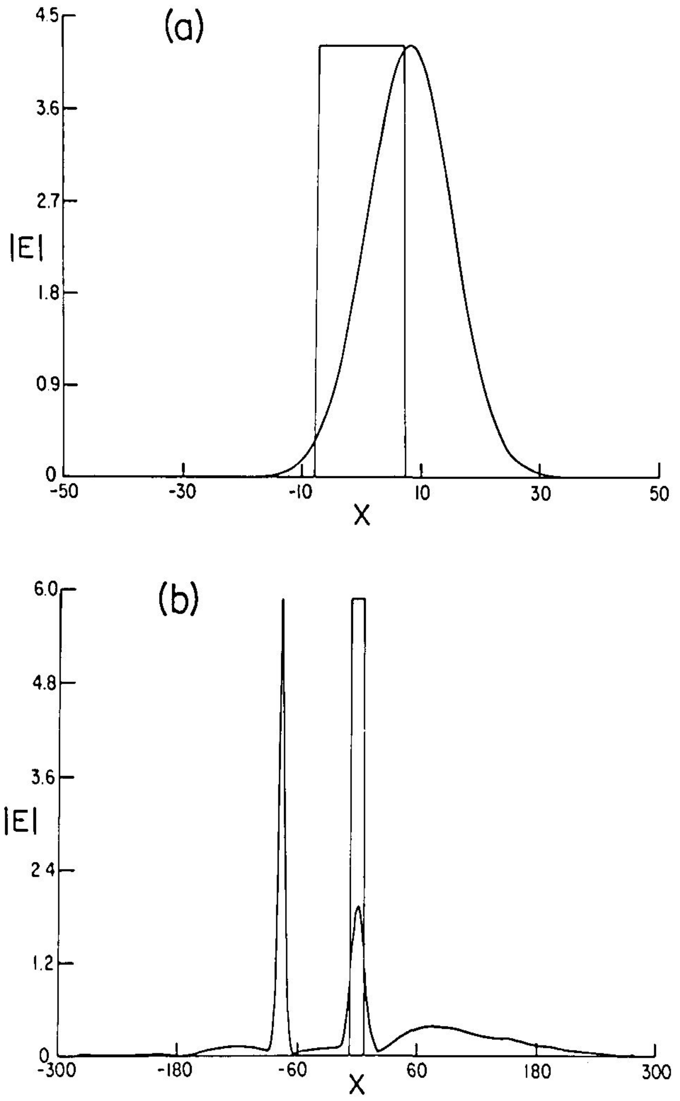
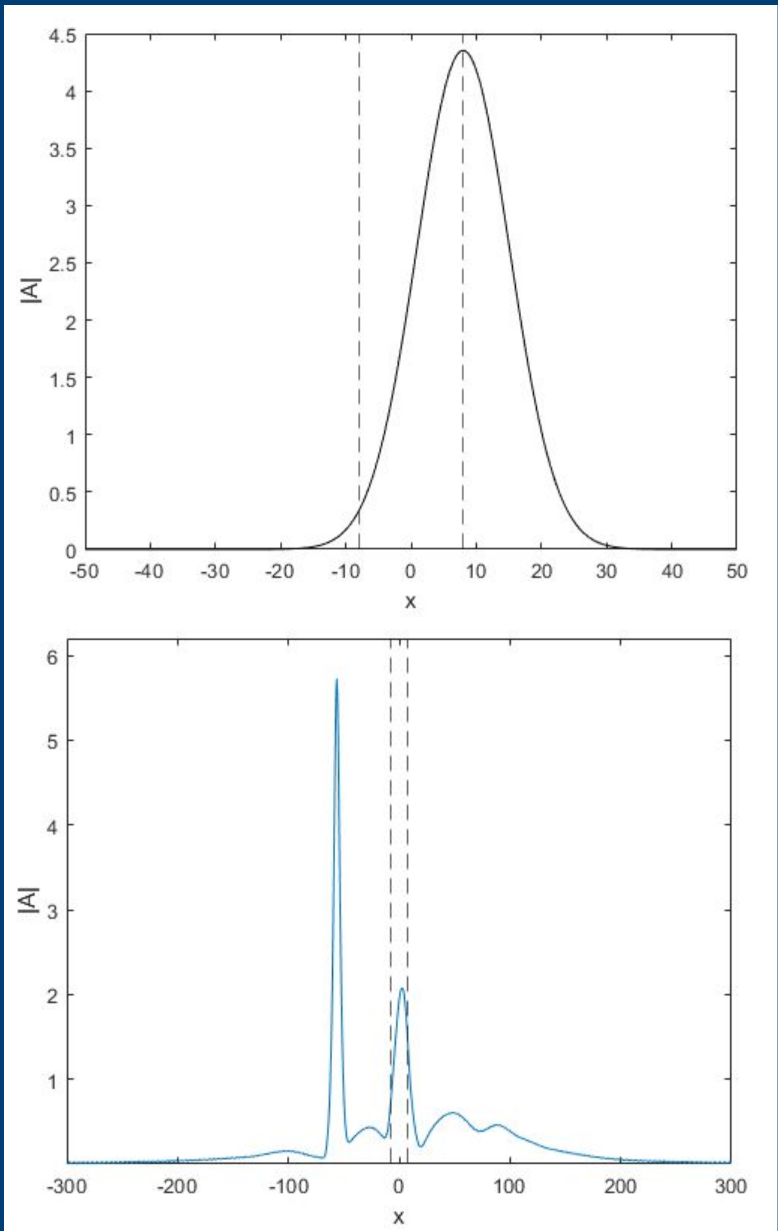
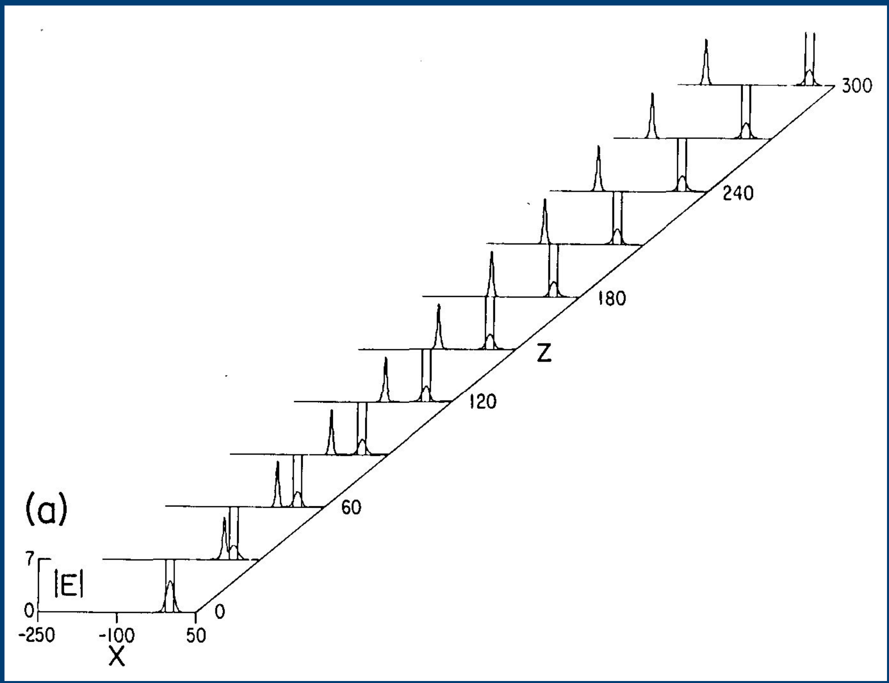
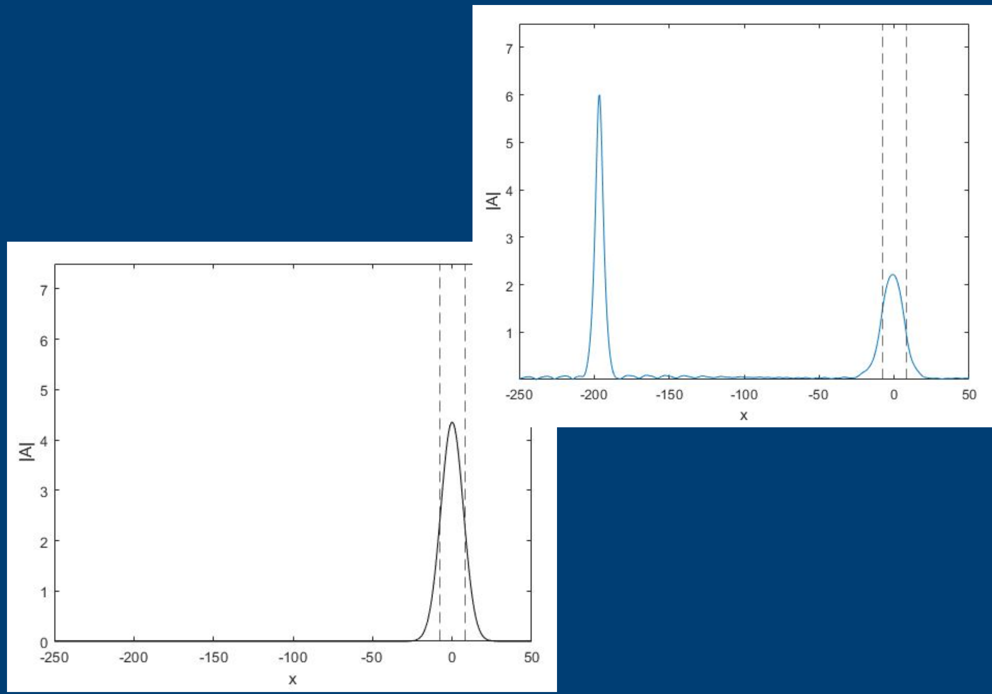


Fig. 5. Soliton emission in the presence of a transverse displacement $x_0 = 8$ for an input flux $S_{\text{in}} = 0.22$: (a) input profile, (b) field after $100\lambda_0$.



Soliton emission in the presence of input-beam misalignments (angular displacement)





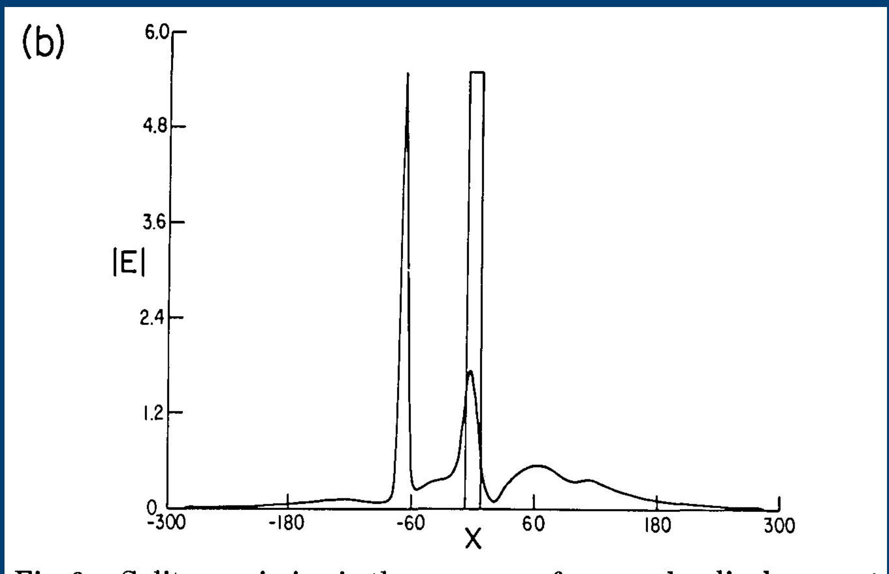
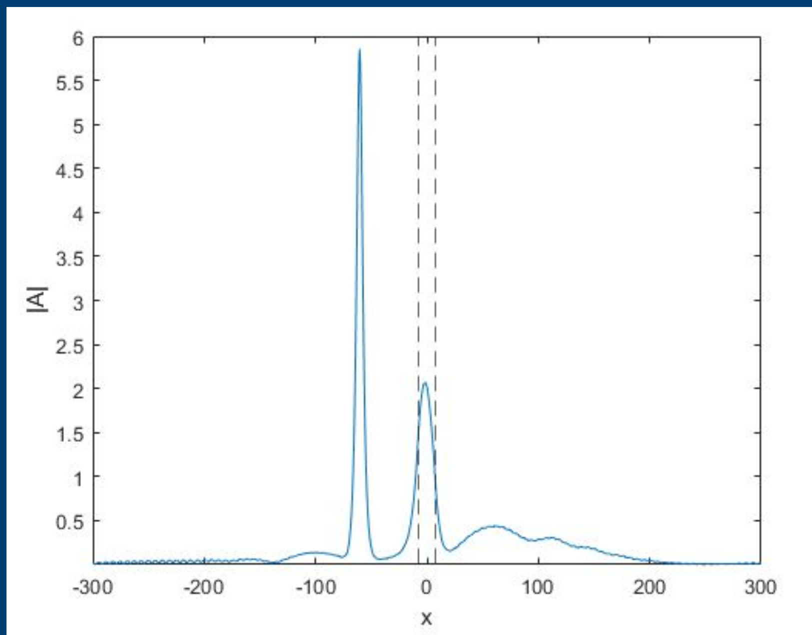


Fig. 6. Soliton emission in the presence of an angular displacement for an input flux $S_{\text{in}} = 0.22$: (a) $\theta = -0.1$, (b) $\theta = 0.1$.



Soliton emission in the presence of saturation

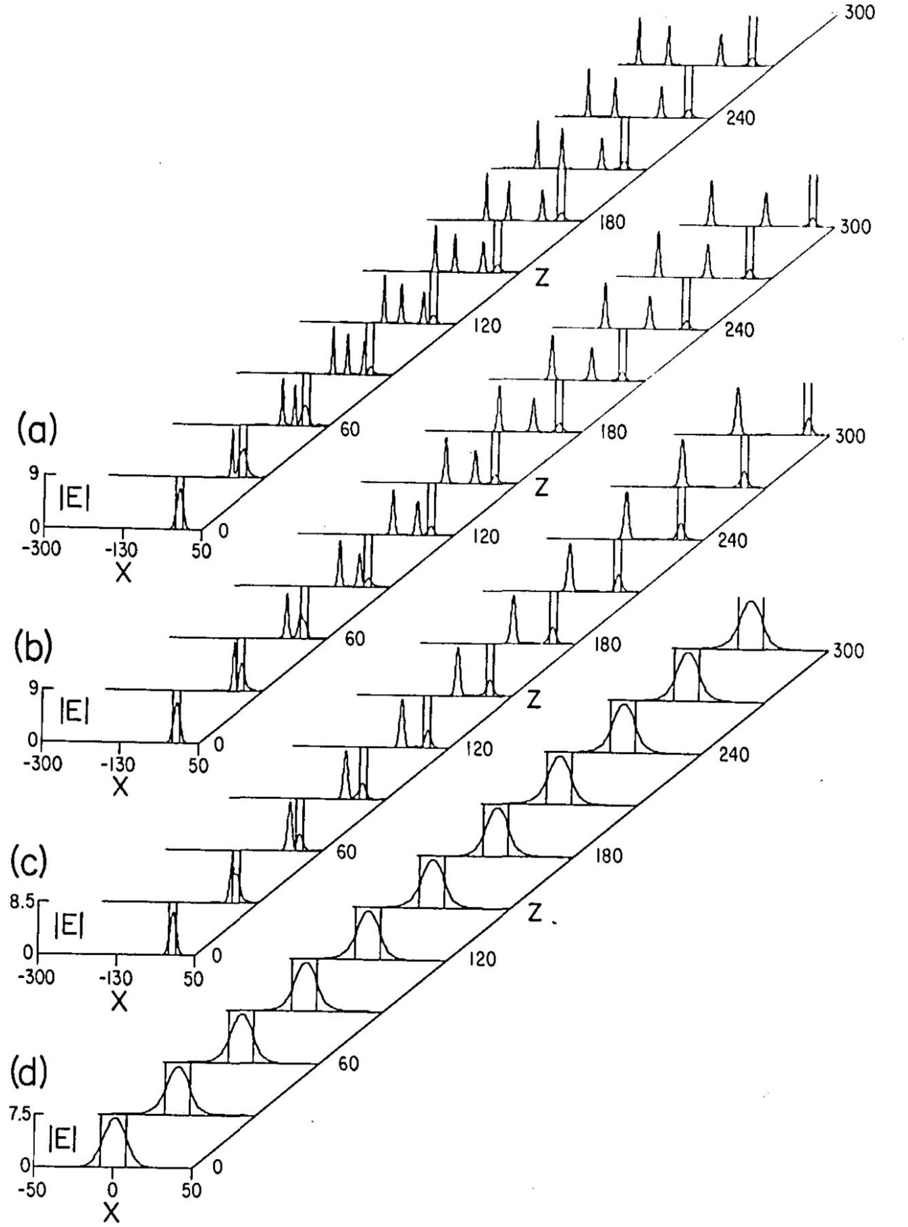


Fig. 7. Soliton and solitary-wave emission in the presence of saturation for an input flux $S_{\text{in}} = 0.6$: (a) $\chi = 0$, (b) $\chi = 0.02$, (c) $\chi = 0.05$, (d) $\chi = 0.5$.