

fiberdesk – graphical user interface

Modern GUI with access to parameter setup and field solution:

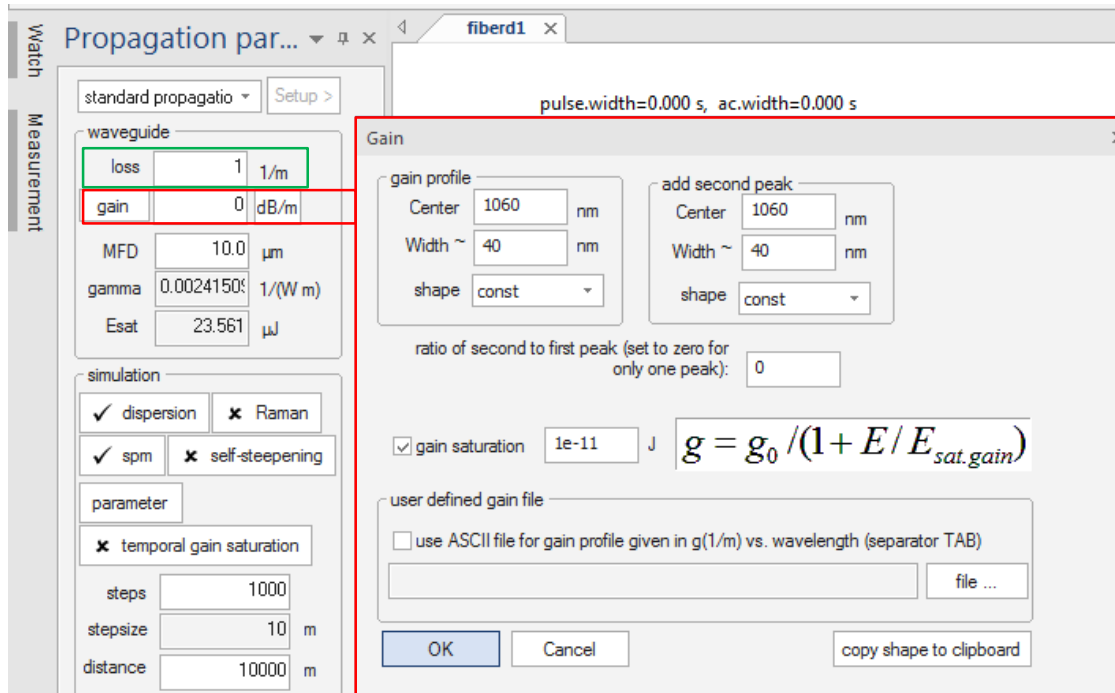
The screenshot shows the fiberdesk GUI with several key components highlighted:

- Ribbon control:** Located at the top right, it contains icons for various functions like 'Start', 'parameter variation', 'RE Results', 'PLOTTER', 'noise variation', 'set z=0', 'Compress', 'Set', 'Clear', 'Recall', 'Swap', and 'Memory'.
- Propagation parameter:** A panel on the left side containing settings for 'standard propagation', 'waveguide', 'loss', 'gain', 'MFD', 'gamma', 'Esat', and simulation options like 'dispersion', 'Raman', 'spm / TPA', 'self-steepening', and 'temporal gain saturation'.
- Measured values:** A table in the center-left showing simulation results for M5 through M9, including average power, repetition rate, shift, width, and RMS.
- Main View:** The central area containing two plots: a 'Field' plot showing a pulse in the time domain (Time in ps) and a 'Spectrum' plot showing the pulse's frequency content (Wavelength in μm). Below the plots, simulation parameters are listed: distance: 0.000 m, position: 0.000 m, energy: 1.000 nJ, average power: 50.000 W, roundtrip: 0.
- Measured graphs:** A grid at the bottom left for visualizing measurement data.
- Output:** A console window at the bottom right displaying the text '1>Welcome to fiberdesk 6.0 ...' and '2'.

fiberdesk – NLSE parameter setup

Parameter access in detail:

$$\frac{\partial A}{\partial z} = -\frac{\alpha}{2} A + \int_{-\infty}^{\infty} \frac{g(\omega)}{2} \tilde{A}(\omega) e^{-i\omega T} d\omega + \sum_{n \geq 1} \beta_n \frac{i^{n+1}}{n!} \frac{\partial^n}{\partial T^n} A + i\gamma \cdot \left(1 + i\tau_{shock} \frac{\partial}{\partial T} \right) \left(A(T) \int_{-\infty}^{\infty} R(\tau) |A(T-\tau)|^2 d\tau \right)$$



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Propagation parameter

standard propagatio Setup >

waveguide

loss 1 1/m

gain 0 dB/m

MFD 10.0 μm

gamma 0.0024150 1/(W m)

Esat 23.561 μJ

simulation

dispersion

spm self-steepening

parameter

temporal gain saturation

steps 1000

stepsize 10 m

distance 10000 m

live measure

write file 100

adaptive 2e-007

local error presets: ▾

random temporal clipping

dispersion term

$$\frac{\partial A}{\partial z} = \dots + \sum_{n \geq 1} \beta_n \frac{i^{n+1}}{n!} \frac{\partial^n}{\partial T^n} A$$

dispersion model

Taylor expansion series

Sellmeier coefficients

photonic crystal fiber

Setup >>

force retarded time frame (beta0=beta1=0)

Use dispersion

do not use dispersion

Dispersion Setup

n-th Order Dispersion

predefined fibers: more ...

Taylor Series Expansion @ 1060 nm

Beta1	0	ps/m	compensate at:	800	nm
Beta2	-0.025	ps ² /m	D	41.91107	ps/(nm ² km)
Beta3	0.0	ps ³ /m	S	-0.0790776	ps/(nm ³ km)
Beta4	0				
Beta5	0		Beta10	0	
Beta6	0		Beta11	0	
Beta7	0		Beta12	0	
Beta8	0		Beta13	0	
Beta9	0		Beta14	0	

Trust region

from 0 nm to 0 nm

in case of dual pulse propagation

Beatlength 0 m

group delay mismatch* 0 ps/m

*only possible without forced retarded time frame

force retarded time frame (beta0=beta1=0)

copy dispersion ([nm],D[ps/nm²/km],b2[ps²/m])

copy beta2 + group delay [nm],b2 [ps²/m], GD[ps/m]

OK Cancel grating compressor >> Save Load

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adaptive local error 2e-007

presets: ▾

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dispersion model

Taylor expansion series

Sellmeier coefficients

photonic crystal fiber

force retarded time frame (beta0=beta1=0)

Use dispersion

do not use dispersion

Dielectric dispersive medium

$$n = \sqrt{A + \frac{B_1 \lambda^2}{\lambda^2 - C_1} + \frac{B_2 \lambda^2}{\lambda^2 - C_2} + \frac{B_3 \lambda^2}{\lambda^2 - C_3}}$$

predefined material: more...

A 1

B1 0.6961663

B2 0.4079426

B3 0.8974794

C1 0.00467914826 μm²

C2 0.0135120631 μm²

C3 97.9340025 μm²

OK

fiberdesk – NLSE parameter setup

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Propagation parameter ×

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adaptive 2e-007

local error presets: ▾

random temporal clipping

dispersion term ×

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dispersion model

Taylor expansion series

Sellmeier coefficients

photonic crystal fiber

Setup >>

force retarded time frame (beta0=beta1=0)

Use dispersion do not use dispersion

PCF Parameter ×

Get V over lambda/pitch=0.2

Get n_eff over lambda/pitch=0.2

Get D[ps/nm/km] over lambda/L=0.2

pitch L 5.0 μm

hole diameter d 0.5 μm

d/L 0.1

Material dispersion

$$n = \sqrt{A + \frac{B_1 \lambda^2}{\lambda^2 - C_1} + \frac{B_2 \lambda^2}{\lambda^2 - C_2} + \frac{B_3 \lambda^2}{\lambda^2 - C_3}}$$

predefined material: more...

A	1	C1	0.00467914826 μm ²
B1	0.6961663	C2	0.0135120631 μm ²
B2	0.4079426	C3	97.9340025 μm ²
B3	0.8974794		

OK

fiberdesk – NLSE parameter setup

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Propagation parameter ×

standard propagatio Setup >

waveguide

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gain 0 dB/m

MFD 10.0 μm

gamma 0.0024150 1/(W m)

Esat 23.561 μJ

simulation

dispersion Raman

spm self-scattering

parameter

temporal gain saturation

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stepsize 10 m

distance 10000 m

live measure

write file 100

adaptive local error 2e-007

presets: ▾

random temporal clipping

self phase modulation term

$$\frac{\partial A}{\partial z} = \dots + i\gamma \cdot (1 - f_R) A(T) |A(T)|^2$$

$$\gamma = \frac{\omega_0}{c} \frac{n_2}{A_{eff}} \quad \text{and} \quad A_{eff} = \frac{\pi}{4} MFD^2$$

n2 3.2e-20 m²/W f R 0.18

saturate SPM

saturation power density 1.0 GW/cm²

use SPM exclude SPM

fiberdesk – NLSE parameter setup

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simulation

dispersion Raman

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stepsize 10 m

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live measure

write file 100

adaptive local error 2e-007

presets: ▾

random temporal clipping

term delayed Raman response

hR

t-t' (fs)

gR

f (THz)

$$\frac{\partial A}{\partial z} = \dots + i\gamma \cdot \left(1 + i\tau_{shock} \frac{\partial}{\partial T} \right) \left(A(T) \int_{-\infty}^{\infty} R(\tau) |A(T-\tau)|^2 d\tau \right)$$

$$R(t) = (1 - f_R) \delta(t) + f_R h_R(t)$$

f R 0.18 hR(t) = StepT(t)*(VoigtT(t,1.00,1.69,4.91,1.63)+VoigtT(t,11.40,3.00,10.41,3.66)+VoigtT(t,36.67,6.94,16.49,5.50)+VoigtT(t,ε

VoigtT(t,fs,intensity,position_THz,GaussFWHM_THz,LorentzianFWHM_THz)

StepT(t) - Heaviside step function

multi tone fused silica ▾

use term exclude term

convolute with current spectrum

fiberdesk – NLSE parameter setup

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Propagation parameter x

standard propagatio Setup >

waveguide

loss 1 1/m

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MFD 10.0 μm

gamma 0.0024150 1/(W m)

Esat 23.561 μJ

simulation

dispersion Raman

spm self-steepening

parameter

temporal gain saturation

steps 1000

stepsize 10 m

distance 10000 m

live measure

write file 100

adaptive local error 2e-007

presets: v

random temporal clipping

term self steepening

$$\frac{\partial A}{\partial z} = \dots + i\gamma \cdot \left(1 + i\tau_{shock} \frac{\partial}{\partial T} \right) \left(A(T) \int_{-\infty}^{\infty} R(\tau) |A(T-\tau)|^2 d\tau \right)$$

$$\tau_{shock} \cong \tau_0 + \tau_A = \frac{1}{\omega_0} - \left[\frac{1}{n_{eff}} \frac{dn_{eff}(\omega)}{d\omega} \right]_{\omega_0} - \left[\frac{1}{A_{eff}} \frac{dA_{eff}(\omega)}{d\omega} \right]_{\omega_0}$$

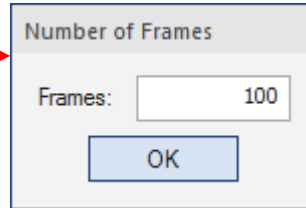
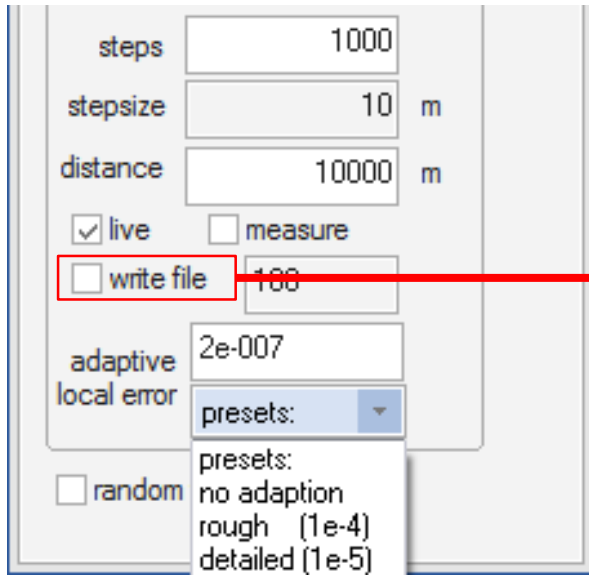
additional shock time tau_A 0.0 fs

use self steepening term exclude self steepening

fiberdesk – NLSE parameter setup

Propagation setup: distance, stepsize, numerical accuracy etc.

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file contains the initial field plus 100 fields from the calculated propagation for later analysis

file extension: *.BPF