

lecture 1

Content:

Learn the most simple workflow ... page 2

Measure something along z ... page 3

User defined measures (B-Integral) ... page 5



lecture 1 - Learn the most simple workflow

Three simple steps:

- (1) create a pulse
- (2) choose parameters
- (3) press start

The screenshot shows the fiberdesk software interface with three steps highlighted by red boxes and numbered circles:

- Step 1:** The 'Field' icon in the 'Main' menu is highlighted.
- Step 2:** The 'Propagation parameter' dialog box is open, showing various simulation parameters like waveguide, loss, gain, MFD, gamma, Esat, and simulation options (dispersion, Raman, spm/TPA, self-steepening, temporal gain saturation).
- Step 3:** The 'Start' button in the toolbar is highlighted.

Other visible panels include:

- Measurement:** A plot showing a pulse profile with a peak at approximately 0.05 m.
- Watch:** A table of user-defined measurements.
- Output:** A text area for simulation results.

data	value
pulse 1	
M0 - index	100
M1 - position	0.200 m
M2 - distance	0.200 m
M3 - datapoints	2048
M4 - pulse energy	927.201 pJ
M5 - pulse_avg_power	231.800 W
M6 - pulse_rep_rate	250.000 GHz
M7 - pulse_shift	-482.714 fs
M8 - pulse_width	1.134 ps
M9 - pulse_RMS	752.218 fs
M10 - pulse_skewness	0.342
M11 - pulse_kurtosis	-0.864
M12 - pulse_max_phase	13.7 rad
M13 - pulse_peakpower1	817.472 W
M14 - pulse_peakpower2	767.964 W

lecture 1 - Measure something along z

To measure different values of the numerical field that fiberdesk is propagating:

- (1) choose „measure and parse“ and setup the number of measurement points along z, which should be equal or less than the number of steps. (button with three dots)
- (2) After propagation, you will see the measured values as instantaneous values or graphs along the propagation.

The screenshot displays the Fiberdesk software interface. The 'Propagation parameter' window is open, showing settings for standard propagation, waveguide properties (loss, gain, MFD, gamma, Esat), and simulation options (dispersion, Raman, spm/TPA, self-steepening, temporal gain saturation). The 'steps' are set to 100, 'stepsize' to 0.002 m, and 'distance' to 0.2 m. A red box highlights the 'measure and parse' checkbox, which is checked, and a red arrow points to a button with three dots next to the 'write file' field. A circled '1' is placed next to this button.

The 'Measurement' window is also open, showing a graph of pulse energy vs distance. The y-axis ranges from 1.40638199E-08 to 5.1406382E-07, and the x-axis ranges from 0 to 0.15. A blue curve shows the pulse energy increasing with distance. A circled '2' is placed next to the graph.

The 'Watch' window shows a table of user-defined measurements:

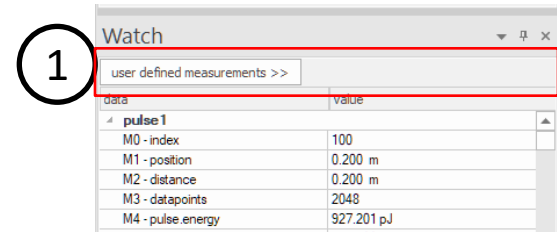
data	value
pulse 1	
M0 - index	100
M1 - position	0.200 m
M2 - distance	0.200 m
M3 - datapoints	2048
M4 - pulse energy	927.201 pJ

A dialog box titled 'Number of frames to write' is open, showing 'Frames: 1000' and '+ 1 additional frame, which is the initial field'. It also includes a 'filename' field with 'test.bpf' and an 'OK' button.

lecture 1 - User defined measures (B-Integral)

You can also define your own measurement in addition to the pre-defined options. You need to:

- (1) Open the dialog „user defined measurements >>“
- (2) Script your own function by either using values measured before or math expressionen with variables



M84 = just an example, no meaning

Now real example: How to measure the B-Integral? (shown by several user defined measurements for educational reasons) We translate the equation to measured values and a function that integrates (summation) along z.

$$B = \gamma \int_0^L P_{Peak}(z) \cdot dz$$

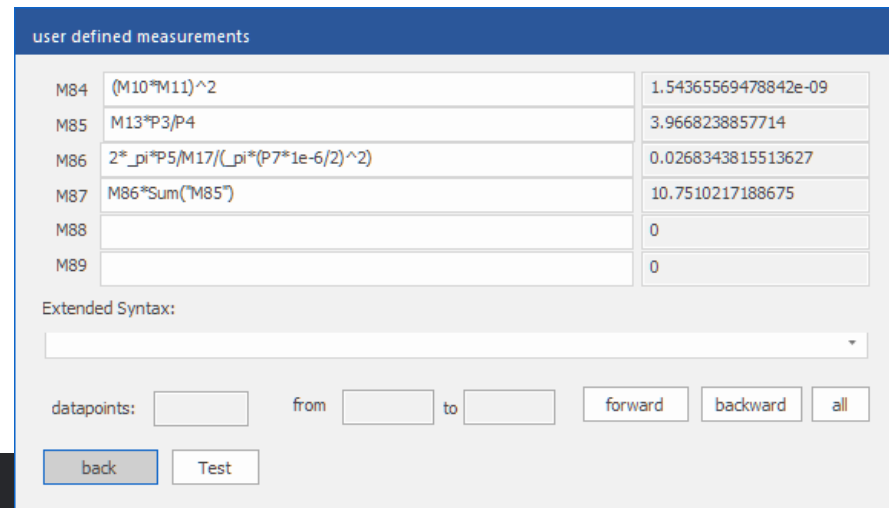
with

$$\gamma = \frac{2\pi n_2}{\lambda A_{eff}}$$

$$M86 = 2 * \pi * n_2 / \lambda / (\pi * (MFD_um * 1e-6 / 2)^2)$$

$$M85 = P_{Peak} * L / Steps$$

$$M87 = \gamma * Sum("M85")$$



Hint: excecution times are slowed down by complex measurements.