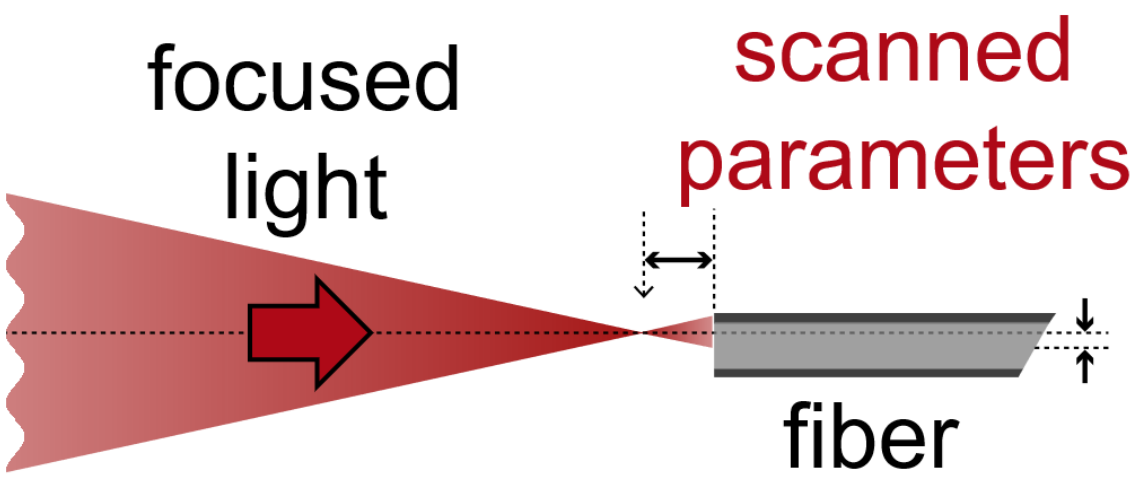
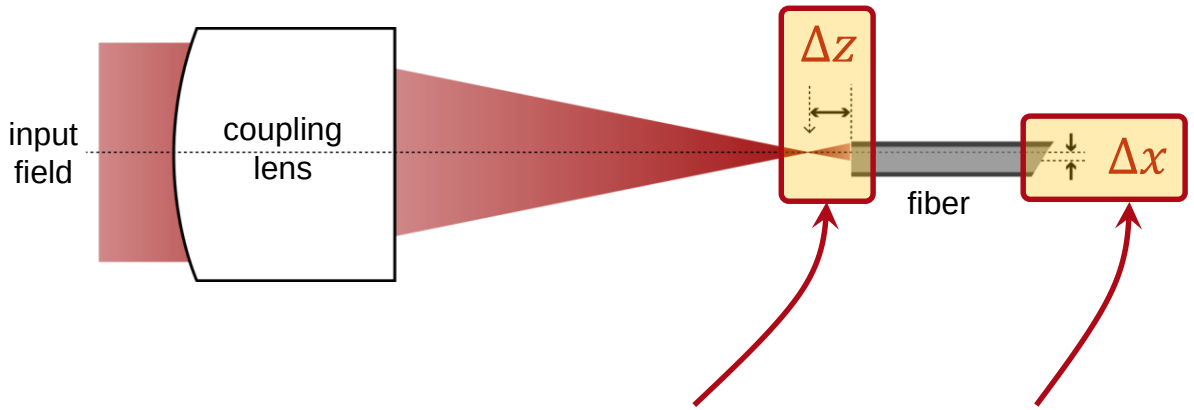
Scanning Mode of Parameter Run

Abstract

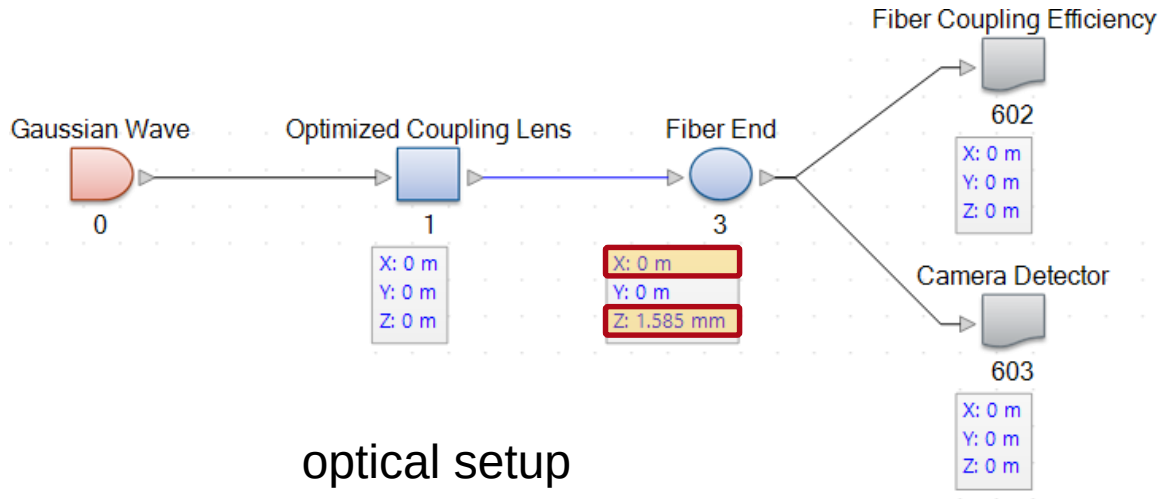


The scanning mode of VirtualLab Fusion's Parameter Run document allows to perform an automatic simulation series for all combinations of specified parameter variations. This use case demonstrate this feature based on a tolerancing analysis regarding the efficiency of a fiber coupling setup where the fiber is longitudinally and laterally misplaced. The Parameter Run document also provides specific options for a very illustrative display of corresponding results.

Configuration of Parameter Variation: Parameter Selection

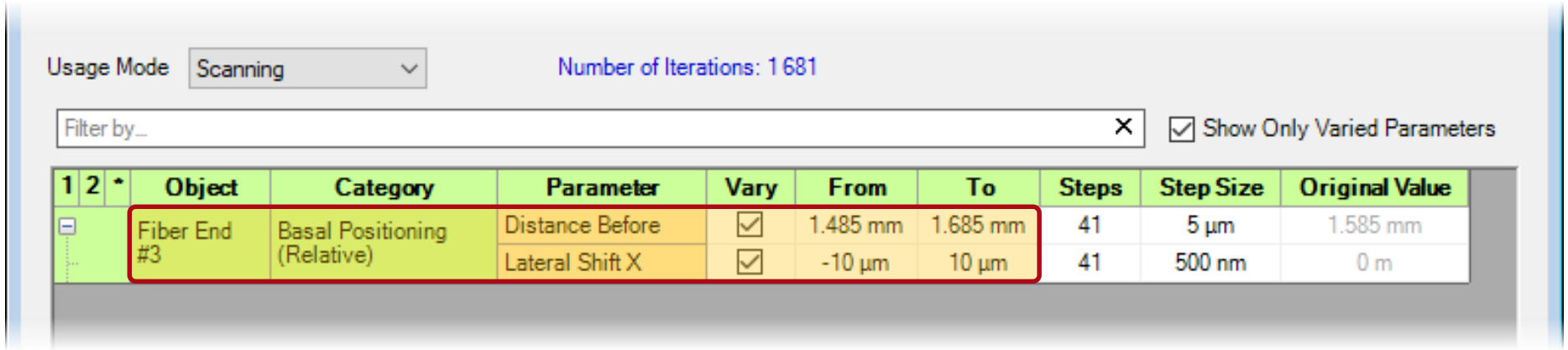


varied parameter #1 & parameter #2



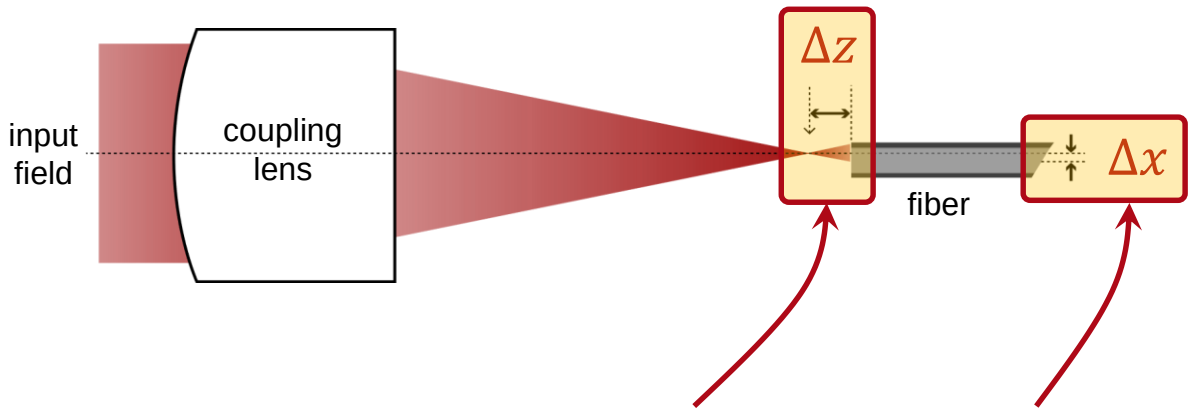
optical setup

parameter run document



1 2 *	Object	Category	Parameter	Vary	From	To	Steps	Step Size	Original Value
	Fiber End #3	Basal Positioning (Relative)	Distance Before	☑	1.485 mm	1.685 mm	41	5 µm	1.585 mm
			Lateral Shift X	☑	-10 µm	10 µm	41	500 nm	0 m

Configuration of Parameter Variation: Definition of Steps

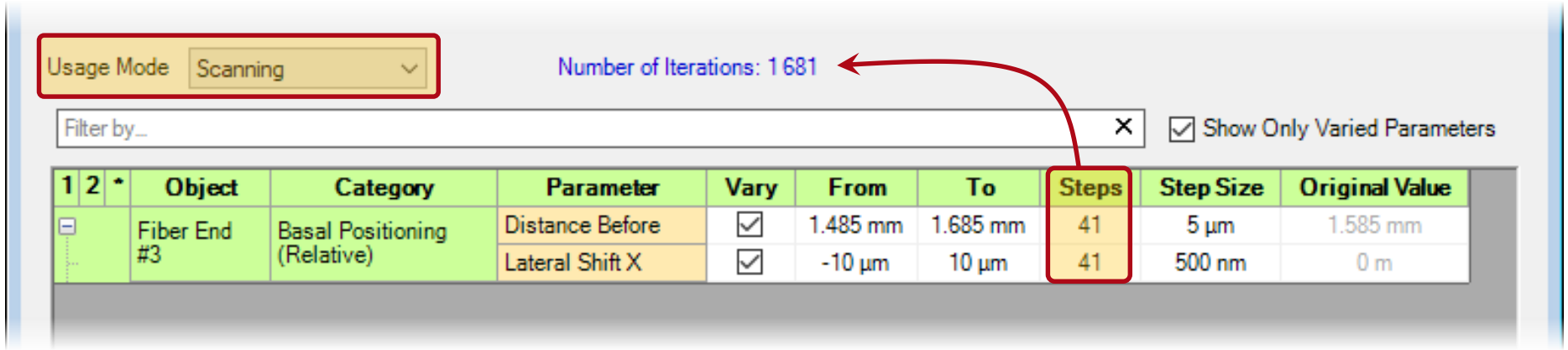


The scanning mode performs a serie of simulations with all combinations of the i selected parameters (p_i) and their specified number of steps (n_i).

This might result in a large number N of total simulations. E.g.

- for $i = 2 \rightarrow N = n_1 \times n_2$
- for $i = 3 \rightarrow N = n_1 \times n_2 \times n_3$

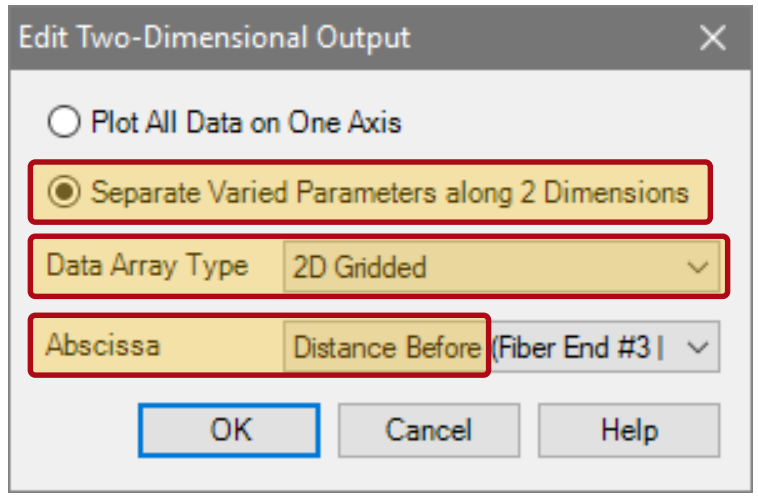
parameter run document



Selection #1 of Result Display – 2D Type

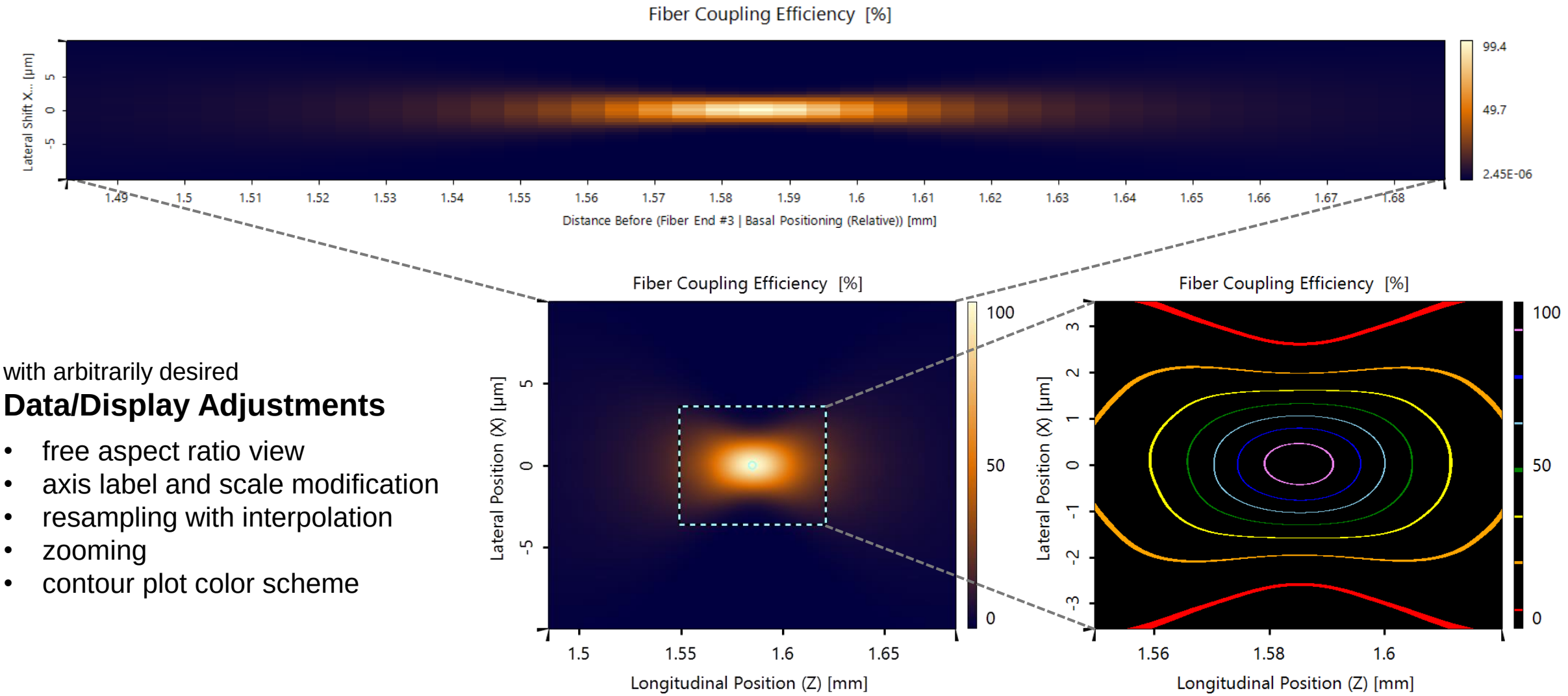
			Iteration Step						
Detector	**Subdetector**	**Combined Output**	1	2	3	4	5	6	7
Varied Parameters	Distance Before (Fiber End...	Data Array	1.485 mm	1.485 mm	1.485 mm	1.485 mm	1.485 mm	1.485 mm	1.485 mm
	Lateral Shift X (Fiber End #...	Data Array	-10 µm	-9.5 µm	-9 µm	-8.5 µm	-8 µm	-7.5 µm	-7 µm
Fiber Coupling Efficiency...	Fiber Coupling Efficiency	Data Array	0.78894 %	0.90613 %	1.0168 %	1.1516 %	1.3274 %	1.4852 %	1.5986 %

parameter run document > result page



Often for **2 scanned parameters**,
a predestined result display is generated by
putting these separately on the x- and y-axis.

Result: Efficiency against Toleranced Parameters



with arbitrarily desired

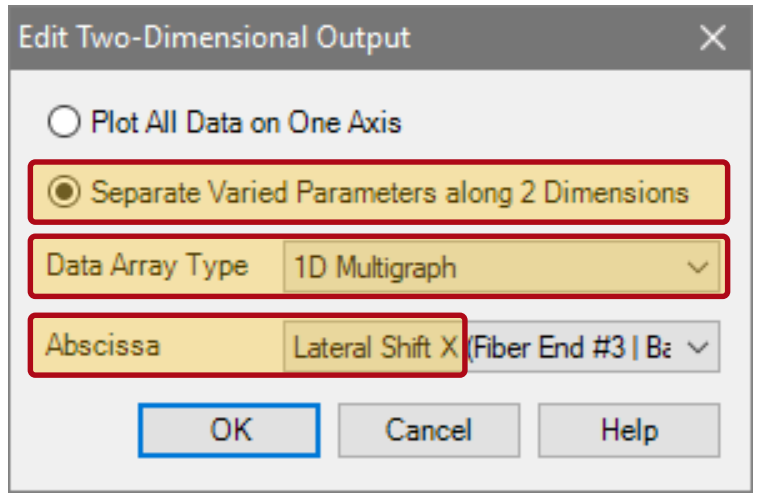
Data/Display Adjustments

- free aspect ratio view
- axis label and scale modification
- resampling with interpolation
- zooming
- contour plot color scheme

Selection #2 of Result Display – 1D Type

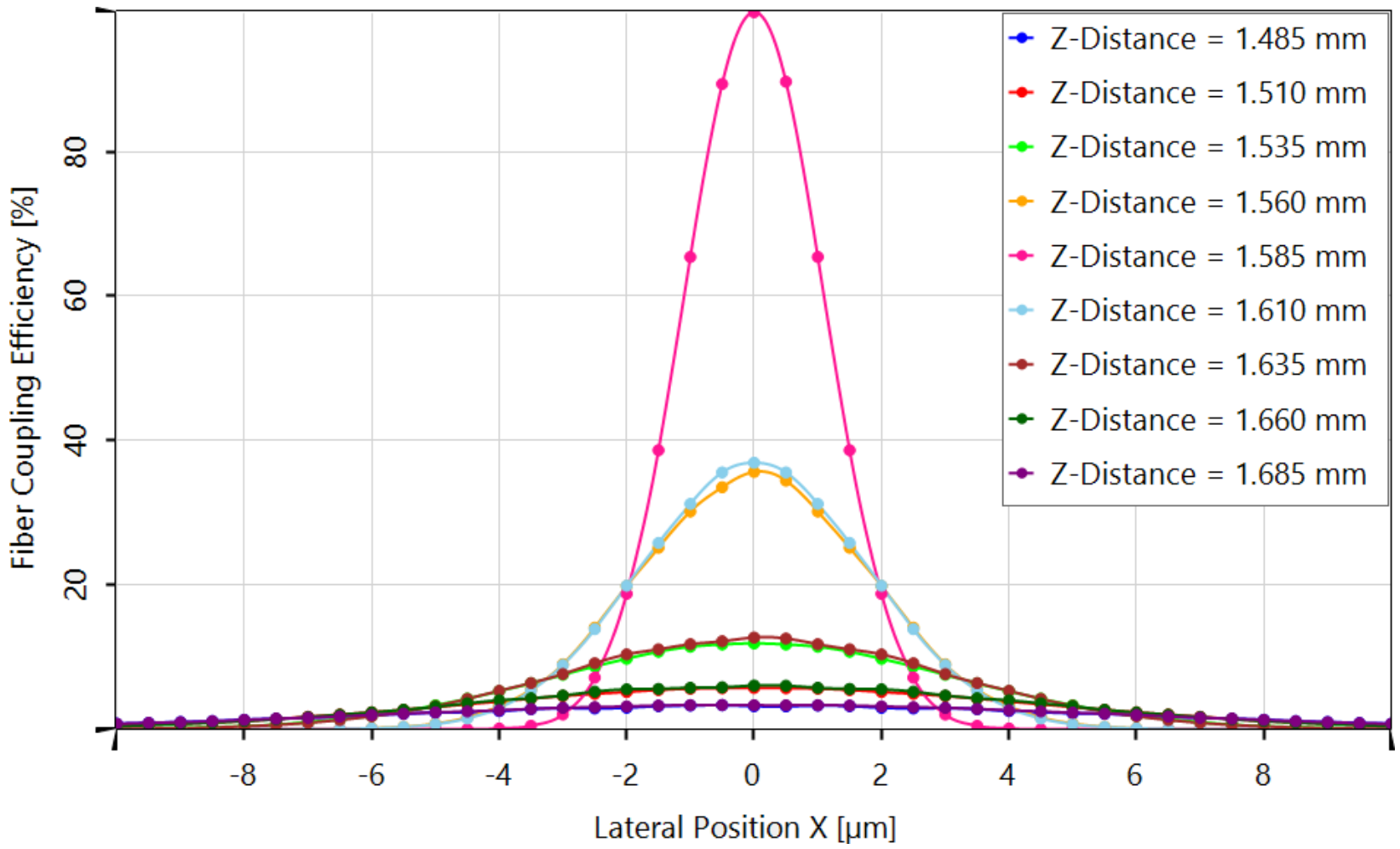
			Iteration Step						
Detector	**Subdetector**	**Combined Output**	1	2	3	4	5	6	7
Varied Parameters	Distance Before (Fiber End...	Data Array	1.485 mm	1.485 mm	1.485 mm	1.485 mm	1.485 mm	1.485 mm	1.485 mm
	Lateral Shift X (Fiber End #...	Data Array	-10 µm	-9.5 µm	-9 µm	-8.5 µm	-8 µm	-7.5 µm	-7 µm
Fiber Coupling Efficiency...	Fiber Coupling Efficiency	Data Array	0.78894 %	0.90613 %	1.0168 %	1.1516 %	1.3274 %	1.4852 %	1.5986 %

parameter run document > result page



In case one of two parameter was varied in less steps, the **1D Multigraph display** might be a very handy option. Here we checked the same variations for the x-position but at only 9 different z-planes.

Result: Multigraph Display



Document Information

title	Scanning Mode of Parameter Run
document code	MISC.0075
version	1.0
toolbox(es)	Starter Toolbox
VL version used for simulations	7.5.0.158
category	Feature Use Case
further reading	- Usage of the Parameter Run Document - Tolerance Analysis of a Fiber-Coupling Setup - Programming a Scanning Parameter Run - Animation Generation from Chromatic Fields Sets in Parameter Run - Export of Results of a Parameter Run