

P-SC Research project title:

Soliton fission and soliton dynamics as the underlying mechanism of supercontinuum generation in microstructure fibers.

TASK:

There is a paper attached to this package. As noted in the class it was chosen by the instructor because it has a view angle similar to that taken in our class discussion. Your task is to employ numerical simulation and reproduce key results from the paper.

A) As a first step, study the paper and decide on the input parameters. Follow the simulation template we used in the class.

B) Decide which aspects of the paper you will try to reproduce. Your simulations should include the frequency shift versus power (or intensity) and/or propagation distance.

C) Execute your simulations and discuss aspects that you have reproduced and those that are different. Compare your outcomes to those of the experiment and also to the simulation shown in the paper. Discuss possible reasons for differences if any.

DELIVERABLE:

Report in pdf format. Input file(s) for your simulations, sample data or graphics illustrating your results.

OPTIONAL EXTENSION:

There is a graph showing the calculated dispersion of the fiber studied in the paper. You may try to digitize the curve shown, derive the corresponding susceptibility table and employ it in your simulations. The results should be then close to the simulations results shown in the paper.

To obtain susceptibility from the data, you need to convert to and represent the gvd numerically, and integrate twice w.r.t. angular frequency to obtain $k(\omega)$. From there you derive susceptibility. You will need two integration constants which you may adjust as to match (approximately) the refractive index at two different wavelengths to the values corresponding to the silica strand you used in the base project.

START-FROM-MATERIAL:

wrk_050_Supercontinuum_Microstructure_Fiber provides a suitable template. This package also contains a set of effective susceptibility tables calculated for nano-meter sized silica strands. Choose one that you deem most suitable to mimic the fiber studied in the experiment.