

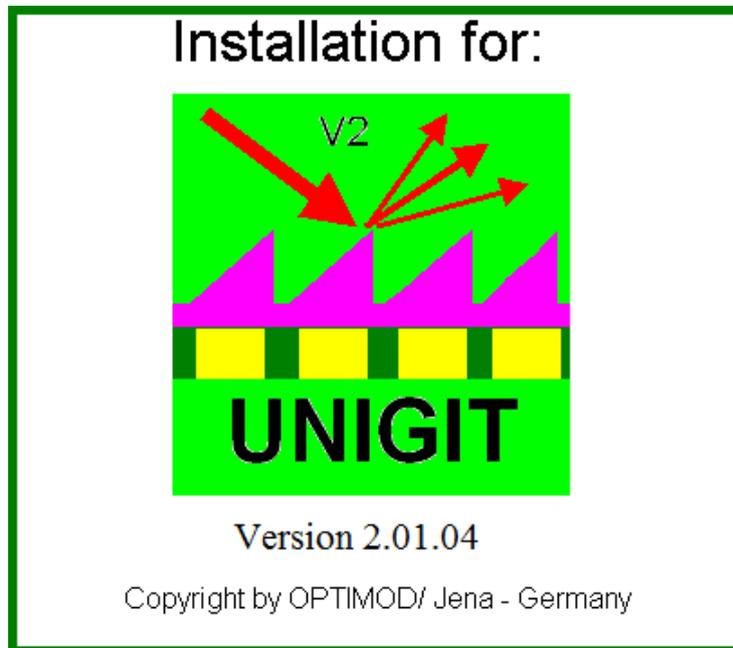
# UNIGIT

versatile rigorous grating solver

## UNIGIT RIGOROUS GRATING SOLVER

VERSION 2.01.04

**QUICK START**



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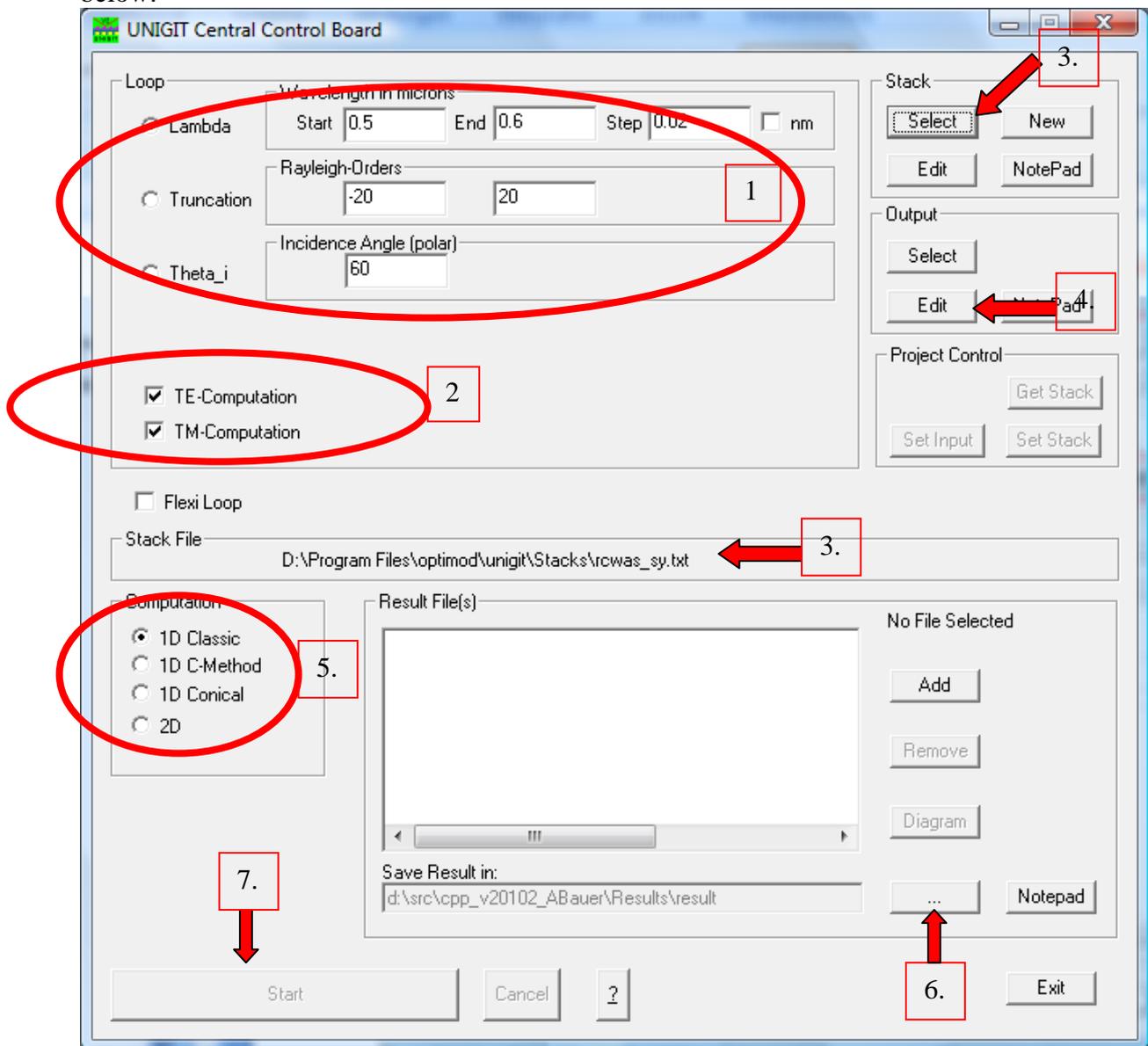
# 1. Introduction

This is a quick guide how to get Unigit running. More detailed information can be found in the Unigit user manual.

In order to run UNIGIT, one has:

- First, to describe and to input the [diffraction problem](#).
- Second, one shall [start the computation](#).
- Eventually, the last step is the reviewing of the [results](#).

After starting the code it comes up with the so-called Central Control Board shown below. First, you have to setup the input for your diffraction computation as shown in Figure 1 below.



**Figure 1:** Central Control Board showing the consecutive steps to get Unigit running

1. Specify the excitation and select the loop parameter or run a batch processing by checking the flex loop box
2. Select the polarisation (relevant only for 1D classic)
3. Select/ Create a grating stack
4. Specify the output conditions for the results to be calculated
5. Select the solver routine (make sure that it matches the specified grating stack see 1.3, usually Unigit will automatically detect the appropriate solver routine and check the radio button)
6. Select a file to where to solve the results (this will activate the *START* button)
7. Finally, start the computation by clicking the *START* button



## 2. Formulating the Diffraction Problem

First, the optical problem or task has to be formulated and to be rendered to the corresponding input tables of the program. Here, mainly three issues have to be obeyed, namely:

- First, the **Stack** has to be defined.
- Second, the **optical excitation** has to be specified.
- Third, the way how the **results** shall be output has to be determined.

### 2.1. Define the Stack

The patterned multilayer stack embedded between superstrat and substrate has to be specified. To this end, you can either select an existing stack file by means of the **SELECT**-button or start building a new stack by clicking the **NEW**-button in the group area **STACK**. Of course, you can also modify an existing file by clicking the **EDIT**-button. Depending on whether you decided to perform a 1D or 2D calculation the appropriate Stack editor is launched (The same happens of course when you clicked the **NEW**-button.). If the selected file does not match, an error message occurs.

### 2.2. Specify the Optical Excitation

In this second step, the optical excitation conditions (wavelength, incidence angles, polarization) have to be set:

Select the loop you want to have with the radio button in the upper left of the Central Control Board and input the values for:

- Wavelength,
- Truncation order (i.e., number of Rayleigh orders to keep during calculation),
- Polar incidence angle (in degrees),
- Azimuthal incidence angle (in degrees) – only available for conical or 2D case.

Under certain circumstances a loop over an arbitrary stack parameter may be offered. In the classical 1D-case you can also select the polarization (either TE or TM or both) by fill in the corresponding control fields appearing instead of the azimuthal angle option.

Furthermore, a flexible loop can be run by checking the corresponding box and selecting the loop control file (see manual).

### 2.3. Control the Output

The way how the results are saved in Unigit can be controlled by means of the output editor. It is called by clicking the **EDIT** button in the output group field in the central control board.

After clicking this button, a new window opens with the output editor. Here, you can specify:

- the destination of the output results (screen or file),
- which values are output (e.g., which orders, output as efficiency, phase, amplitude etc.,
- which polarisation for 1D case,
- whether to output reflection and/or transmission,
- the format of the numbers.

More detailed information can be found in the corresponding section of the user manual. After quitting the editor with the OK button, an output.ctr file is saved which is utilized directly by the computation kernel routines to control the output. This ASCII file can also directly viewed with Notepad by clicking the corresponding button in the output group field of the central control board.

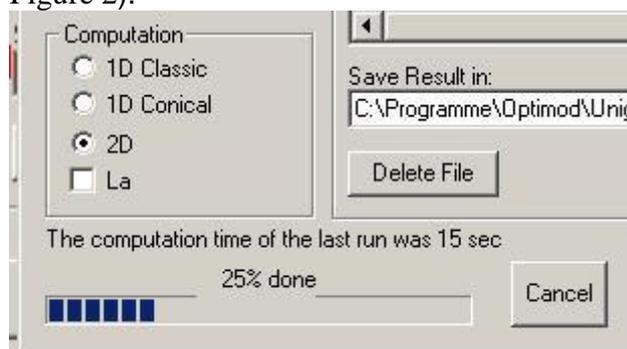
### 3. Start the Computation

Subsequently, the computation is launched by activating one of the three options:

- classical 1D with RCWA,
- classical 1D with C-method,
- conical 1D with RCWA,
- 2D with RCWA,

in the lower left radio button field and clicking the **START**-button below. Before hitting the button, make sure that the wanted stack-file is selected complying with the computation mode (1D or 2D). Otherwise an error message will occur. During computation, a DOS-window appears which may show additional information about the state of numerical calculations. The **START**-button will be replaced by a progress indicator. After having completed the task, the **START**-button appears again and the computation time is displayed above the button.

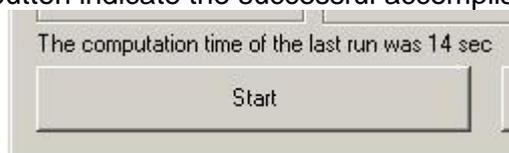
After starting the computation, the progress is shown instead of the *START* button (see Figure 2).



**Figure 2:** Progress bar for Unigit run

It is possible to stop the computation with the *CANCEL* button. If you have checked the “Show Info in DOS Window” check box or the “No output file” radio button in the output editor, a DOS window pops up during computation showing either intermediate auxiliary information or in the latter case the final results.

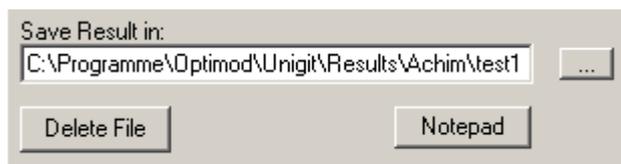
The display of the total computation time for the loop and the reappearance of the **START** button indicate the successful accomplishment of the computation run.





## 4. View the results

Depending on your choice in the output editor, the results are either displayed in the DOS window (and can be copied and pasted from there directly) or they are written into file(s). When written into one file (selection "All in one") it can be viewed immediately after the computation is finished in a Notepad window. To this end, you need just to call it by the *NOTEPAD* button.



Another gadget of the Central Control Board is the graphical interface. It is designed to present the results if the "Single Files" option was chosen for output. In order to view the results in the graphical window, you first have to select which data to present. Here, you need to click the *ADD* button in the result file(s) group field of the central control board. A file selection dialog opens and you can select the result files of your choice.

After the file selection is made, the file name will appear in the related list (see above) and the graphic can be started by clicking the *DIAGRAM* button. The example for the dielectric interface is shown in Figure 3.

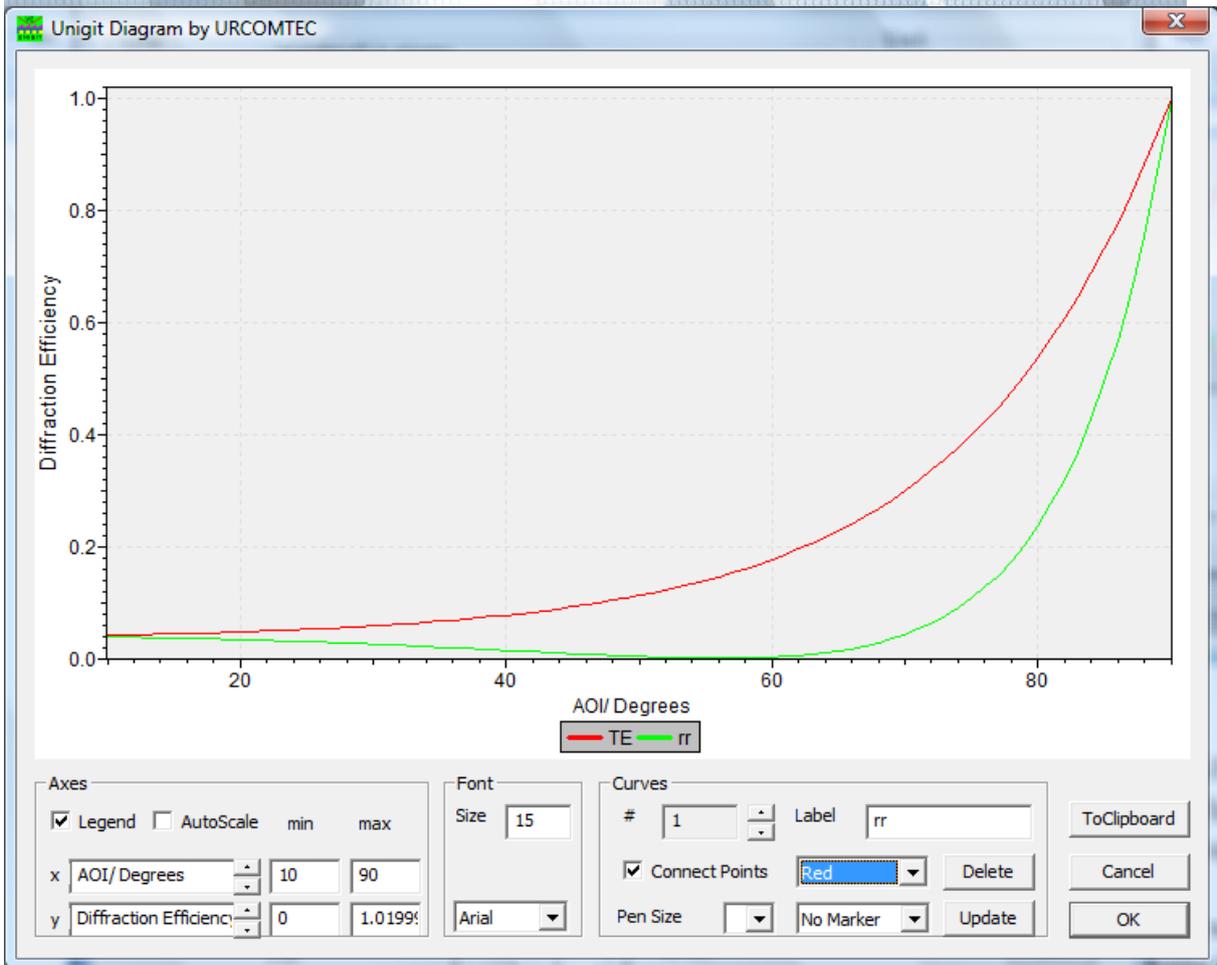


Figure 3: Diagram presentation of Unigit results