Lecturer:
Markus Schellenberg

Tutor:
Klaus Brümann
Wiebke Middelberg

Computing
Final Matlab Project, Winter Semester 18/19
Option 1: Optical Phenomena

29 & 30.11.2018

Please read through this Project description thoroughly and follow the formal and substantial requirements faithfully. It is relevant to your grade.

Create a physically correct simulation of one or more optical phenomena, which were discussed in the lecture Optical Systems.

In the lecture *Optical Systems* (EP Bachelor, 2nd semester) a wide range of optical phenomena has been and is yet to be discussed. Some examples are: diffraction (e.g. at a single slit or from an edge), refraction, interference, polarization, polarization at Brewster angle, birefringence, total internal reflection, Snell's law, beam path in telescopes, microscopes and other optical systems, speckle patterns and much more.

You should select one or more of these large or small phenomena and simulate them physically correctly. The focus here is on a clear and visually appealing graphical representation. The purpose of the simulation is to give the students that attend *Optical Systems* an understanding of these optical phenomena.

Features:

- A Graphical User Interface for user input is not required but also not undesired.
- The output should be graphical.
- Additional text can be included if helpful e.g. the actual angles of beams or the used equation and the parameters which are being varied.
- If you choose a more complicated phenomenon (e.g. Interference or digital Holography) one simulation with a lot of details and possible user interactions could be enough for the project. If you just simulate simple refraction of a light beam at a surface with different refractive index, you would have to simulate more than one phenomenon.
- A clear and simple 2D plot is good for the understanding.
- A fancy animated 3D plot is good for the coolness factor and will entertain the students. That's good, because then the students might remember this particular phenomenon better.

- Maintaining a balance between (clear and simple) + (fancy and cool) would be the best. For this maybe two graphical outputs would be needed?

As mentioned above, it is planned to show the simulations in the lecture to the EP students. It is not planned to publish the program in the Internet or somewhere else. Of course I would name you as the author(s) of the simulation, unless this is undesired, in which case please let me know.

Formal Requirements

- *The deadline to choose your group project will be Thursday the 20th of December 2018, 4 pm. If you do not choose a project by this day, you will drop out of the course. You will not get a grade for the lecture Introduction to Matlab , but also not a* failed. *If you select a project by this deadline, it is equivalent to registering for the exam in Matlab. If you then do not submit a programming project or do not participate in the colloquium, the course will be considered as failed.*
- *But you can change to some other project until the 7th of January 2019, 4 pm. After this deadline changing of the project is no longer possible.*
- *The deadline to upload your group project to StudIP will be the 17th of January 2019, 8 pm!* ***Absolutely no upload after the deadline will be accepted, regardless of the reason.***
- *Hint: You can upload earlier versions of the project work to StudIP. Your latest upload will be taken as your contribution. In this way, you have handed in your project work even if there is any problem at the end of the upload deadline.*
- *Please make sure that your Matlab code is executable under the Matab version used in the course and that it works correctly. This course uses Matlab version 2017b.*
- *Upload all files which are relevant to the project (.m file, .fig file, .mat file, data files, example files, the exported GUI file if a GUI was created etc.) and the published code to your group's Stud.IP folder. The compression of the data as *.zip file is desired.*
- *Follow the naming convention as they are provided in the Lecture Slides for the very first lecture.*
- *A good documentation* ***(published code and comments)*** *are essential for a good grade.*
- *Include a reference to all sources used in this project, where 3 or more lines of code were used (e.g. in the published code)*
- *Plagiarism will be taken very seriously and appropriate action will be taken if it is discovered that code was copied without referencing or if code was copied from another group.*
- *There will be an oral colloquium about your programming work and MATLAB essentials at the end of the lecture period. Four dates have been reserved for the colloquium. Please check your emails to find out when your colloquium will take place.*
- *The best grades will be provided for creative solutions, elegant programming, fast code, and extra features which go beyond the listed minimum project specifications.*

Have fun and good luck!