Computational Photonics (2016 SS)

by Prof. Thomas PERTSCH at Friedrich-Schiller-Universität Jena in summer term 2016

Lecture and seminar schedule

#	Date	Topic	Lecturer
L01	06.04.	Overview and motivation of the field, Basic numerical methods	Pertsch
S01	11.04.	Refreshing Matlab1	Setzpfandt
L02	13.04.	Matrix method for stratified media	Pertsch
S02	18.04.	Refreshing Matlab2 & Implementation of the matrix method	Setzpfandt
L03	20.04.	Finite difference (FD) mode solver	Pertsch
S03	25.04.	Implementation of the finite difference mode solver	Setzpfandt
L04	27.04.	Beam propagation method (BPM) 1 – scalar	Pertsch
L05	04.05.	Beam propagation method (BPM) 2 – boundary conditions	Pertsch
S04	09.05	Implementation of the beam propagation method	Setzpfandt
L06	11.05.	Finite difference time domain method (FDTD) 1 – basic technique	Pertsch
L07	18.05.	Finite difference time domain method (FDTD) 2 – sources, materials	Pertsch
L08	25.05.	Finite difference time domain method (FDTD) 3 – boundary conditions	Pertsch
S05	30.05	Implementation of the finite difference time domain method	Setzpfandt
L09	01.06.	Guided modes of cylindrical systems – fiber mode solver 1	Pertsch
L10	08.06.	Guided modes of cylindrical systems – fiber mode solver 2	Pertsch
S06	13.06.	Implementation of the fiber mode solver	Setzpfandt
L11	15.06.	Grating methods 1 – 1D	Menzel
L12	22.06.	Grating methods 2 – 2D, FMM/RCWA	Menzel
S07	27.06.	Implementation of grating solver	Setzpfandt
L13	29.06.	Finite element method (FEM) 1	Pertsch
L14	06.07.	Finite element method (FEM) 2	Pertsch
E01	12.07.	Exam (10:00-11:30; Lecture Hall 2, Helmholtzweg 5)	
E02	06.10.	Retake (10:00-11:30; Seminar Room, Helmholtzweg 4)	

LECTURES: Wednesday, 12:25-13:55, lecture hall 2, Abbeanum

SEMINARS: Monday, 10:15–11:45, computer pool PAF, Helmholtzweg 4

For participation in the seminar please acquire a user account at the PAF computer pool (www.pafpool.uni-jena.de) before the first seminar. Please fill out the form user_registration_form_for_computer_pool.pdf and bring it to Dr. Lutz LEINE at room 108, Helmholtzweg 4.

Lecturer

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Seminars

In the seminars, starting from S03, five tasks for small projects will be given. For each project we require that each student prepares a short report of approximately 1 to 2 pages describing his/her solution of the task. The report should include: analysis of the problem, description of the approach taken for its solution, some representative figures from the simulations, as well as a discussion of the physics and numerical properties of the performed simulation. This report together with the written source code must be submitted by email by Friday, 03:00 am (sharp!) preceding the following seminar. Every email you send to us should include your name (given and FAMILY) and your student ID. Late submissions will not be accepted since on that Friday morning the model solution to the given problem will be put online.

Please submit your seminar projects to: teaching-nanooptics@uni-jena.de

Exam

Type: written examination without any documents
Subject: content of lectures and seminars
Date/time: 12.07.2016; 10:00 am
Duration: 1.5 hours
Location: Lecture Hall 2, Helmholtzweg 5

Retake of exam

Date/time: 06.10.2016; 10:00 am
Duration: 1.5 hours
Location: Seminar Room, Helmholtzweg 4

Grading

The final grade will be determined by 70% from the exams grade and by 30% from the 5 seminar projects. The exam must be passed to pass the entire course.

Literature

- Specific references for the individual topics will be given during the lectures.
- FDTD-method: A. Taflov and S. C. Hagness, “Computational Electro- magnetics: The Finite-Difference Time Domain Method,” Artech House, 3rd ed. (2005).

Miscellaneous

All lecture scripts and additional material will be posted at: www.iap.uni-jena.de/teaching

Literature – specific for different chapters

- J. Riishede, N. A. Mortensen, and J. Laegsgaard, “A ‘poor man´s approach´ to modeling micro-structured optical fibers,” J. Opt. A: Pure Appl. Opt. 5, 534-538 (2003).
- Zhu and Brown, “Full vectorial …,” Opt. Express 10, 853 (2002).
- Chin-Ping Yu and Hung-Chun Chang, “Yee-mesh-based finite difference eigenmode solver …,” Opt. Express (2004).