Numerical internship in computerized tomography
Numerisches Praktikum zur Computertomographie
SS 2019, Monday 10-12, Wednesday 12-14, SR 6, E2 4

Computerized tomography (CT) is one of the most famous imaging modalities, particularly in medicine or nondestructive testing. The goal is the noninvasive visualization of the inside of a body to enable diagnosis or detect irregularities. To this end, the body is illuminated with X-radiation. When the radiation propagates through an object, it is attenuated according to the density of the respective tissue or material. The attenuated radiation is measured on the other side of the object. These scans are conducted from different angles to increase the amount of data. It is possible to reconstruct the attenuation coefficient of the body from these measurements. Mathematically, the absorption of the X-radiation is modelled using the Radon transform. The imaging process involves the numerical solution of the respective inverse problem.

This course is designed to combine the mathematical background of computerized tomography with the numerics that are required to calculate a CT image from given, possibly noisy data. In the beginning, the focus is on the mathematical model and its analysis, as well as reconstruction techniques. In the second half of this course, the focus will be on the numerical implementation of CT imaging, involving the creation of phantoms, the generation of synthetic data and the numerical reconstruction. This can be done in small groups. The results from the practical part will be presented at the end of the semester.

You will find further information on our website www.num.uni-sb.de/schuster.

For questions, please do not hesitate to contact Anne Wald (wald@math.uni-sb.de) or Rebecca Klein (klein@num.uni-sb.de).