

Course content for International Master program „Mathematical modeling, computation and optimization“

Course name	Introduction to Wavelets
Contents and Objectives	<p>Contents:</p> <ul style="list-style-type: none"> • Haar wavelets • Scaling functions • Multiresolution Analysis • Orthogonal Wavelets • Decomposition and reconstruction algorithms • Biorthogonal Wavelets. <p><u>Objectives of the course:</u> The wavelet transform was introduced because the classical Fourier transform does not adequately reflect local features of a function (such as singularities or derivation jumps). The wavelet transformation allows a wide range of applications in signal analysis, pattern recognition, data compression and numerics. In the lecture, a uniform approach to wavelet theory is described. Examples include, but are not limited to Haar-, Daubechies- and Spline-Wavelets. Particular we present efficient reconstruction and decomposition algorithms.</p>
Teaching	<p>This course consists of lectures and exercise classes.</p> <ul style="list-style-type: none"> • Lecture: Wavelets (4h/week) • Exercise class: Wavelets (2h/week)
Prerequisites	Basic notions of Analysis, Linear Algebra
Examination	Oral exam (30 minutes)
Credits	8 ECTS points
Frequency	This course is given at least every second year.
Workload	The estimated total working time for this course is 240 hours.
Duration	This course is given during one semester.