November 2010.

Subdivision Surface Course Notes

These course notes were prepared using PowerPoint, and then converted to pdf format. They are based on the book "Introduction to the Mathematics of Subdivision Surfaces", by L.-E. Andersson and N. F. Stewart, SIAM, 2010. The notes are divided into 10 sections. There is also an eleventh section, in the file 0.0TableOfContents.pdf, which consists of a single-page table of contents.

In the course for which these notes were prepared, the material is presented over a period of 10-12 course hours, divided into sections of 2 hours each. Comments in addition to the material in the slides are added by the instructor, depending on the needs and interests of the students.

The course is given annually to a small number of graduate students in computer science. The mathematical background of most students in the course is very strong, but as already stated, they are not graduate students in mathematics. The main research interest of most students is in computer graphics, computer vision, or image processing: few (although some) are specifically interested in subdivision surfaces as a major part of their research. The mother tongue and usual language of most students is French, but their competence in English is usually somewhere between good and fluent. The course notes cover only a fraction of the book, and in particular, almost all detailed mathematical proofs are omitted.

The material presented in the course notes is preceded by about 10 hours on other topics, not covered in the book, which give an introduction to the mathematics of solid-modelling systems. These topics include for example the definition of an r-set, brief outlines of the topological foundations of the subject (manifolds, the use of Euler operators, and homology modulo-2), a summary of Bézier, B-spline and NURBS curves and surfaces, and trimmed-NURBS representations. Some of this preliminary material is summarized very briefly at the beginning of the course notes.