4

11:45–12:15

A B-Spline Finite Element Approach for Designing Freeform Objects

P. Kagan
Technion — Israel Institute of Technology

In CAD systems, sculptured shapes are adequately represented by B-splines. For a pure geometrical approach, however, a large number of mathematical degrees of freedom is required to control the global behavior of a complex shape. Therefore, it is difficult to design sculptured and freeform surfaces with a CAD system that relies solely on a B-spline geometrical approach. To reduce this problem, the speaker will propose an alternative intuitive approach based on physical qualitative behavior, in which the model mechanism is based on a B-Spline Finite Element (FE) technique.
The speaker will discuss the influence of the inherent properties of B-spline FE on the physical-based model. These B-spline properties include uniform spacing (UBS) or non-uniform spacing (NUBS) of knot vectors and number and degree of the B-spline function. Several examples of sculptured surfaces designed using the proposed physical-based module will be shown.
Joint work with A. Fischer, P. Bar-Yosef, and M. Shpitalni.

5

12:15–12:45

Visualization of Meshes Based on Level of Detail Quadtrees

Y. Hochwald
Technion — Israel Institute of Technology

An advanced CAD method for visualization is required for efficient, real-time display of meshes derived from solutions such as the Finite Elements (FE) method. Such FE solutions are likely to contain a massive data base. For real-time display, this data must be reduced while still preserving solution behavior. That is, even at lower levels of resolution, critical areas must be preserved.
The speaker will propose an adaptive LOD technique for meshing. The meshes are represented by hierarchical structures, such as quadtree. The LOD of the meshes describe changes in time and space for a physical and geometric surface at any level of resolution. This technique will be demonstrated through colored 3D morphing between meshes at different times. In addition, an algorithm for isocurves based on the marching cube method was developed and implemented. Several examples of 3D morphing will be demonstrated.
Joint work with A. Fischer and P. Bar-Yosef.

INVITATION

ISRAEL SIGGRAPH PROFESSIONAL CHAPTER MEETING

Sponsored by

Silicon Graphics (Israel) Ltd.

8:30–12:45
13 June 1997
Hall 6 (near Lev Hall and Shenkar Bldg.)
Tel-Aviv University

Chair: Dani Lischinski
The Hebrew University of Jerusalem

This invitation is an entry permit for your car at gate 4 of the Tel-Aviv University campus.

8:30–9:00

Refreshments

$\boxed{1}$

9:00–9:30

Selective Pixel Transmission for Navigating in Remote Virtual Environments

Yair Mann
Tel Aviv University

The speaker will present a technique to improve the performance of a walkthrough in remote virtual environments, where a scene is rendered jointly by the server and the client, in order to reduce the network requirements as much as possible. The client generates novel views by extrapolating a reference view based on the locally available geometric model, while the server transmits data necessary to prevent an accumulation of errors. Within this concept, the speaker will show that by transmitting only a selected subset of pixels, the quality of the extrapolated views can be improved while requiring less bandwidth. The talk will focus on the selection process in which the visibility gaps between the reference view and novel view are detected, packed and transmitted compressed to the client.

$\boxed{2}$

9:30–10:30

Representing Complex Objects with Unions of Spheres

Alain Fournier
University of British Columbia

Representing, simplifying, identifying and manipulating shapes has always been a challenge in computer graphics as well as in computer vision. The speaker will present and illustrate a representation of complex shapes consisting of a union of spheres (UoS) that can help towards meeting this challenge.

The source data considered range from volumetric (CAT, MRI etc.) to the output of 3D scanners. The creation of the UoS from the data involves a Delaunay triangulation (tetrahedralisation in 3D) and the culling of redundant spheres. The simplification of the UoS involves the concept of sphericity (how well a group of spheres is approximated by a single sphere) and some heuristics.

The speaker will give two examples of use of the UoS representation, one to establish a correspondence between two similar objects (for example to register two versions of the same objects), and another to interpolate between two dissimilar shapes (usually known as “morphing”).

The speaker will discuss the use of the UoS representation in defining a metric for shape differences, and issues such as the stability of the representation. Finally, he will touch on practical issues such as the triangulation of the surface of the UoS, texture mapping and computation of mass properties.

10:30–11:15

Coffee Break

$\boxed{3}$

11:15–11:45

Introduction to Arithmetical Geometry through a Medical Imaging Application

Eric Andres
University of Turku, Finland

The speaker will present some basic notions of 2D arithmetical geometry through an application in medical imaging. He will present the 2D discrete line of Reveilles and a line recognition algorithm, and introduce the notion of discrete analytical representation form. These notions will be illustrated in a pixel contouring and distance computation problem that occurs in cancer radiotherapy.