Sampling

Fourier Transformation

$$f(x) = \int_{-\infty}^{\infty} F(\omega) e^{2pj\omega x} d\omega$$

$$F(\omega) = \int_{-\infty}^{\infty} f(x) e^{-2pj\omega x} dx$$

Sinus Cardinalis (sinc)

$$\sin c(x) = \frac{\sin(\pi x)}{\pi x}$$

Texturing

Summed Area Table

$$S(u_0, v_0) = \sum T(u,v) \qquad u \le u_0, v \le v_0$$

Mip-Mapping

$$D = ld\left(\max(d_1, d_2)\right)$$

D Level
d_1, d_2 Diagonalen

Filterung (MipMapping)

$$T_0 := Wert\ von\ D_0 = trunc(D) \quad bilineare\ Int.$$
$$T_1 := Wert\ von\ D_1 = D_0 + 1 \quad trilineare\ Int.$$
$$Pixel = (D_1 - D) \cdot T_0 + (D - D_0) \cdot T_1$$

Kurven

Bezier-Kurven (de Casteljau)

$$b_i^r := (1-t) b_i^{r-1} + t b_{i+1}^{r-1} \qquad b_0^1 := b_i$$

Bezier-Kurve

$$b(t) = \sum_{i=0}^{n} b_i B_i^n(t)$$

Bernstein-Polynom (f. Bezier)

$$B_i^n(t) = \binom{n}{i} (1-t)^{n-i}\ t^i$$

B-Spline

$$s(u) = \sum_{i=0}^{n} d_i N_i^k(u) \qquad \text{(k = Ordnung)}$$

NURBS

$$n(u) = \frac{\sum_{i=0}^{n} \omega_i d_i N_i^k(u)}{\sum_{i=0}^{n} \omega_i N_i^n(u)} \qquad \omega = Gewicht$$

Advanced Modelling

Blobby Objects

$$f(x,y,z) = \sum_k b_k e^{-a_k r_k^2} - T = 0$$

$$r_k^2 = x_k^2 + y_k^2 + z_k^2$$

a,b Faktoren für die Blobbiness
T Treshold

Superellipsen (2D)

$$\left(\frac{x}{r_x}\right)^{2/s} + \left(\frac{y}{r_y}\right)^{2/s} = 1$$

$$x = r_x \cos^s \kappa$$
$$y = r_y \sin^s \kappa$$
$$-\pi \le \kappa \le \pi$$

Superellipsoid (3D)

$$\left[\left(\frac{x}{r_x}\right)^{2/s_2} + \left(\frac{y}{r_y}\right)^{2/s_2}\right]^{s_2/s_1} + \left(\frac{z}{r_z}\right)^{2/s_1} = 1$$