

Gernot Hoffmann

Computer Vision

Documents for Students

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Graphics Collection

September 15 / 2005

Please print everything as grayscale and
replace at least these pages by color prints:

Covi-Lab: 15, 16

Covi-Bild: 16, 18, 19, 20, 35, 38

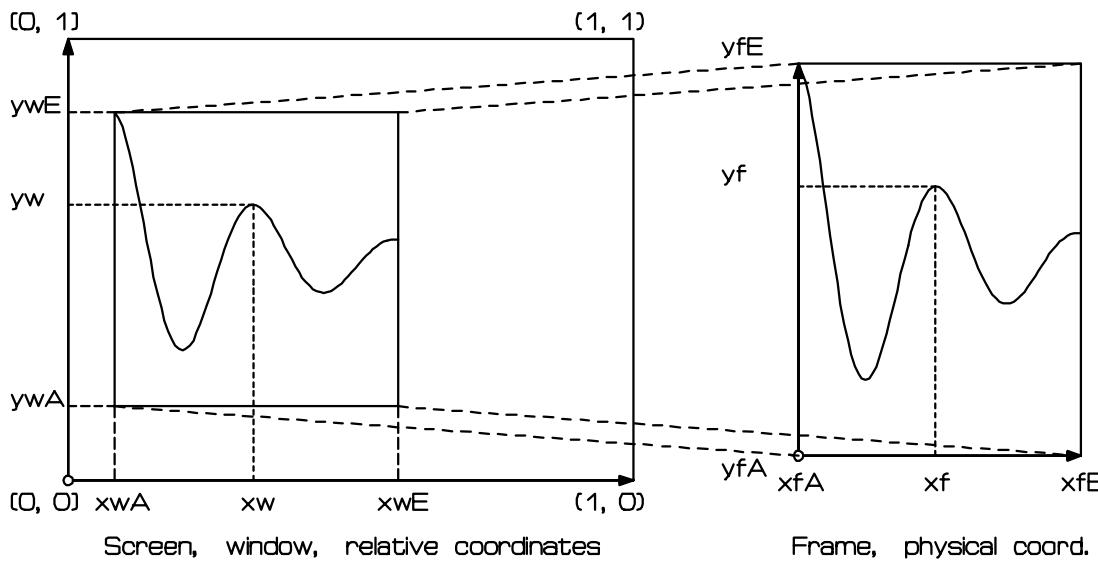


Fig. 1.1 Frame to screen transformation

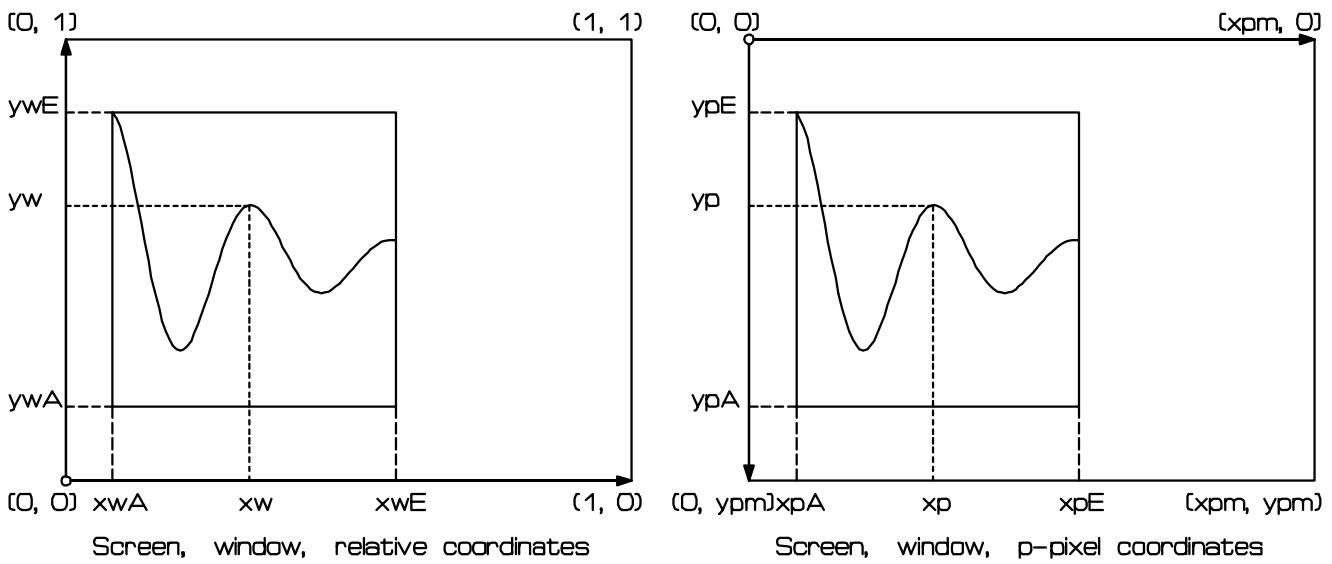


Fig. 1.2 Window to p-pixel transformation

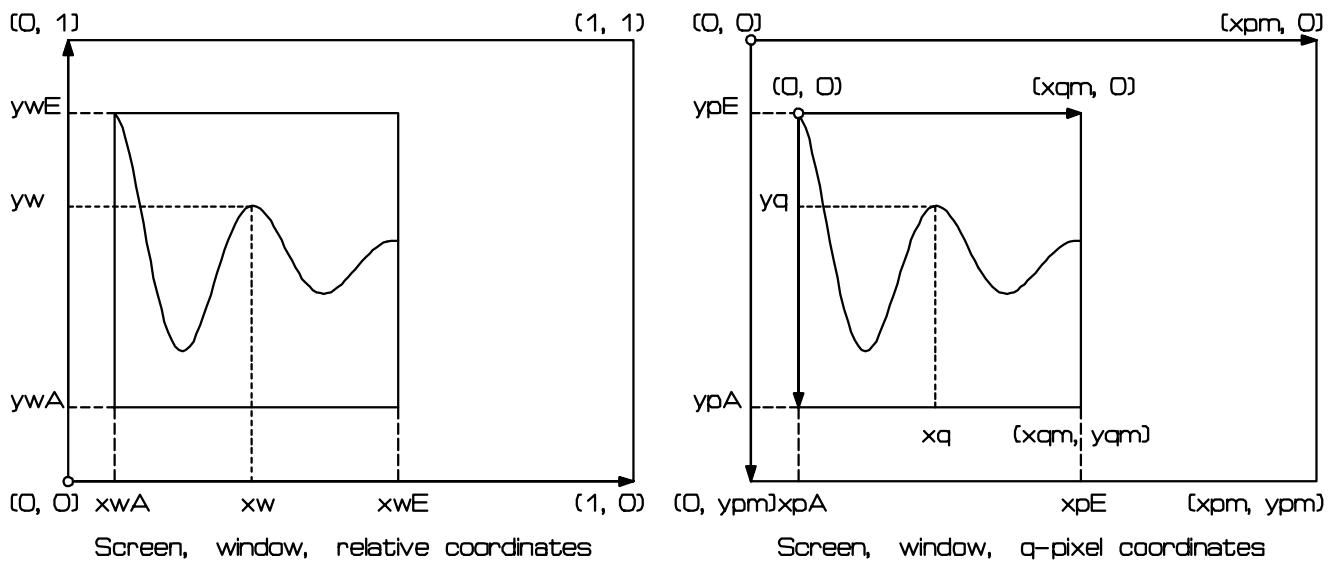


Fig. 1.3 Window to q-pixel transformation

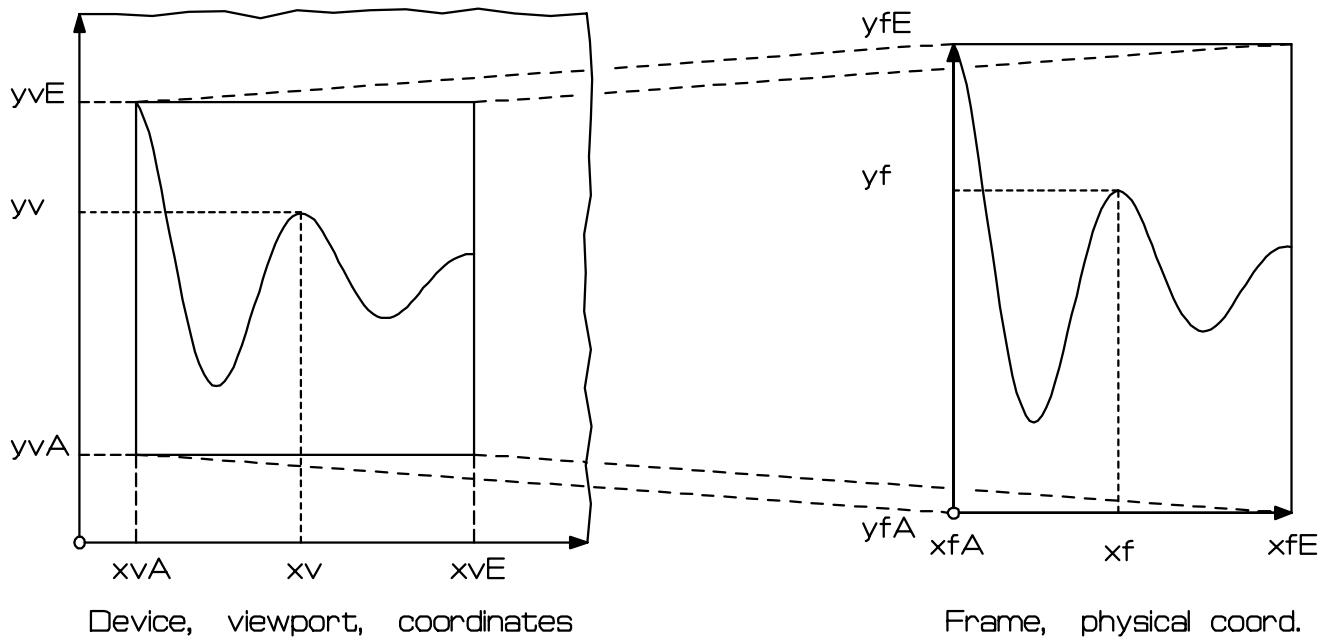


Fig. 1.4 Frame to viewport transformation

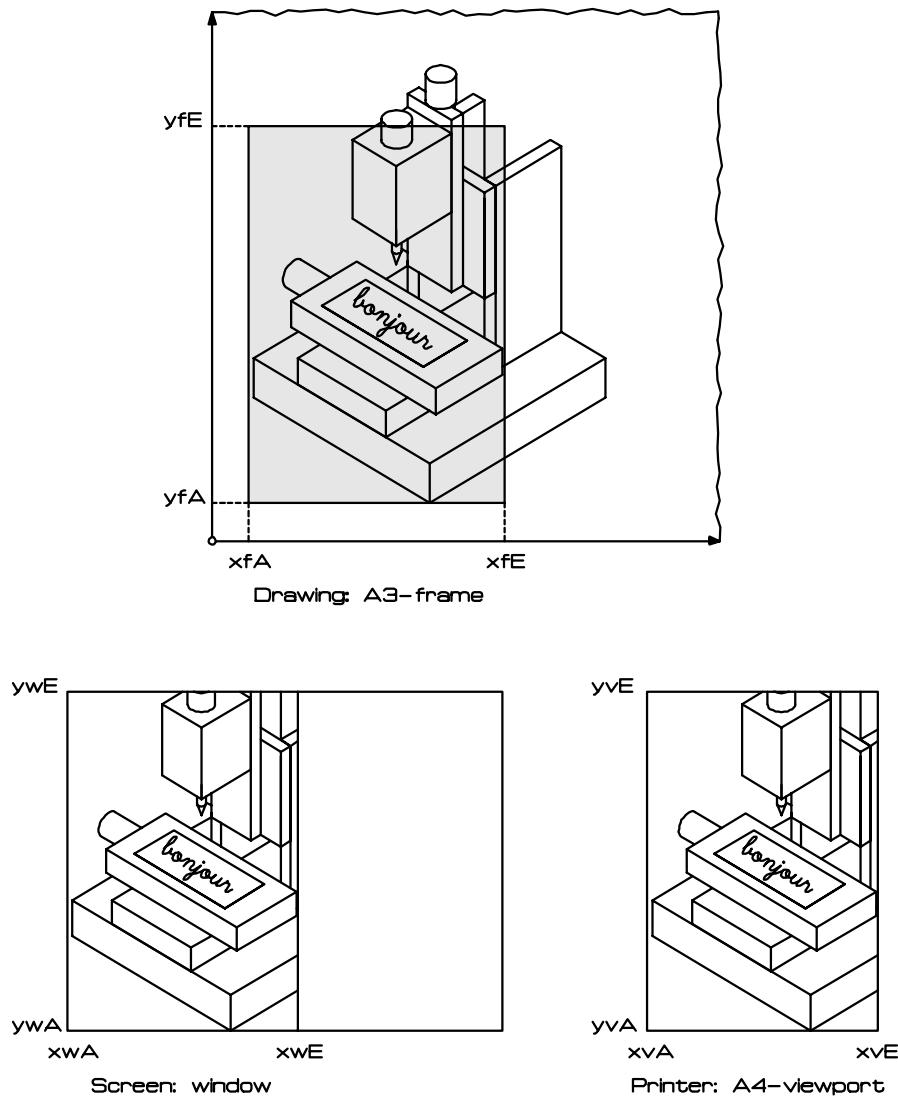


Fig. 1.5 Drawing to screen and printer transformation

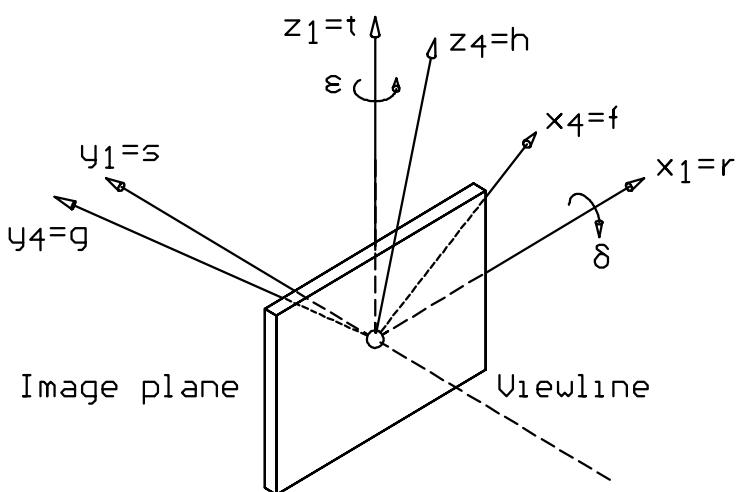


Fig. 2.1 Tilted image plane

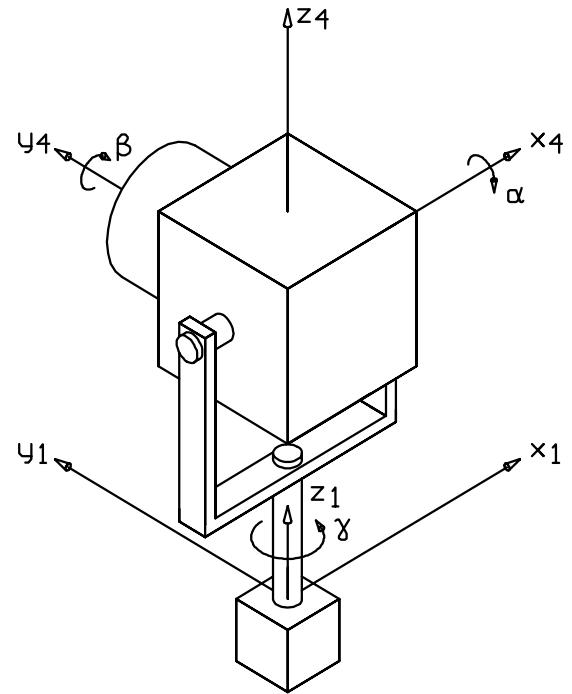


Fig. 2.2 Camera rotation

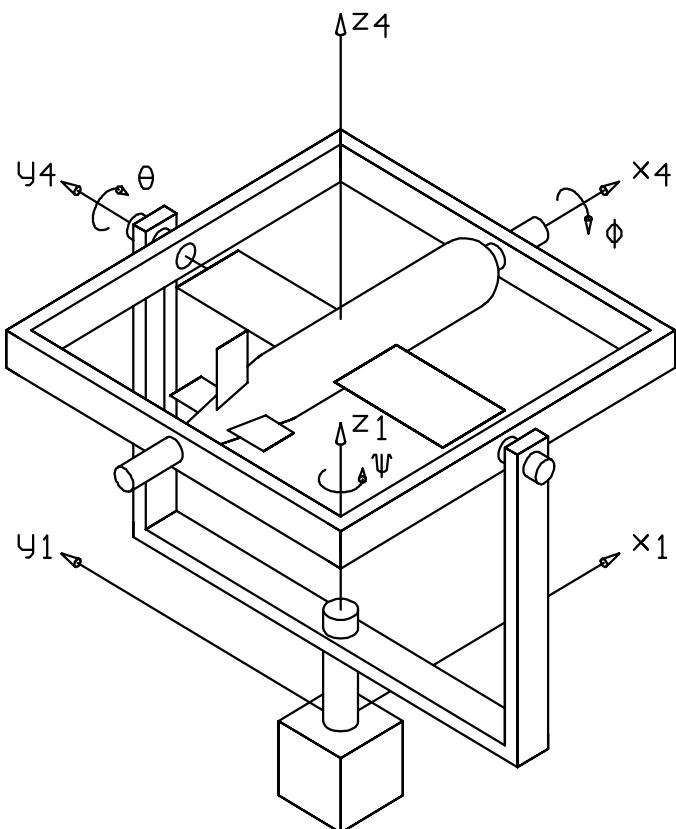


Fig. 2.3 Aircraft rotation

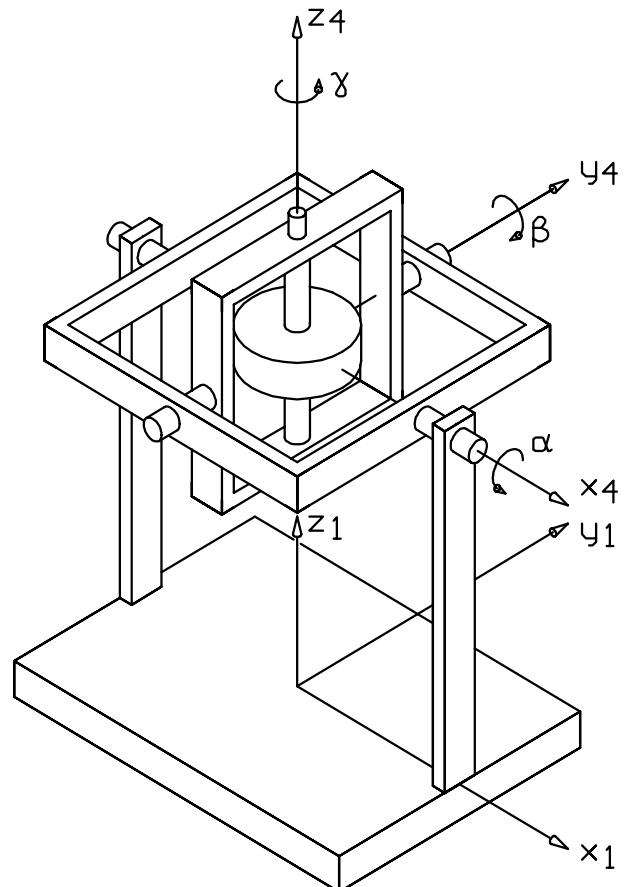


Fig. 2.4 Gyro rotation

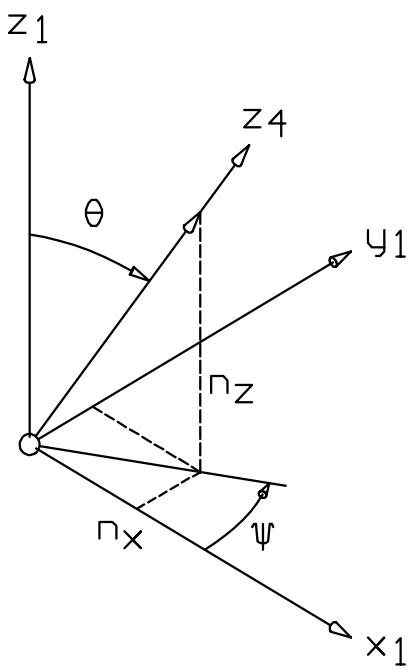


Fig. 2.5 Aligning a body axis

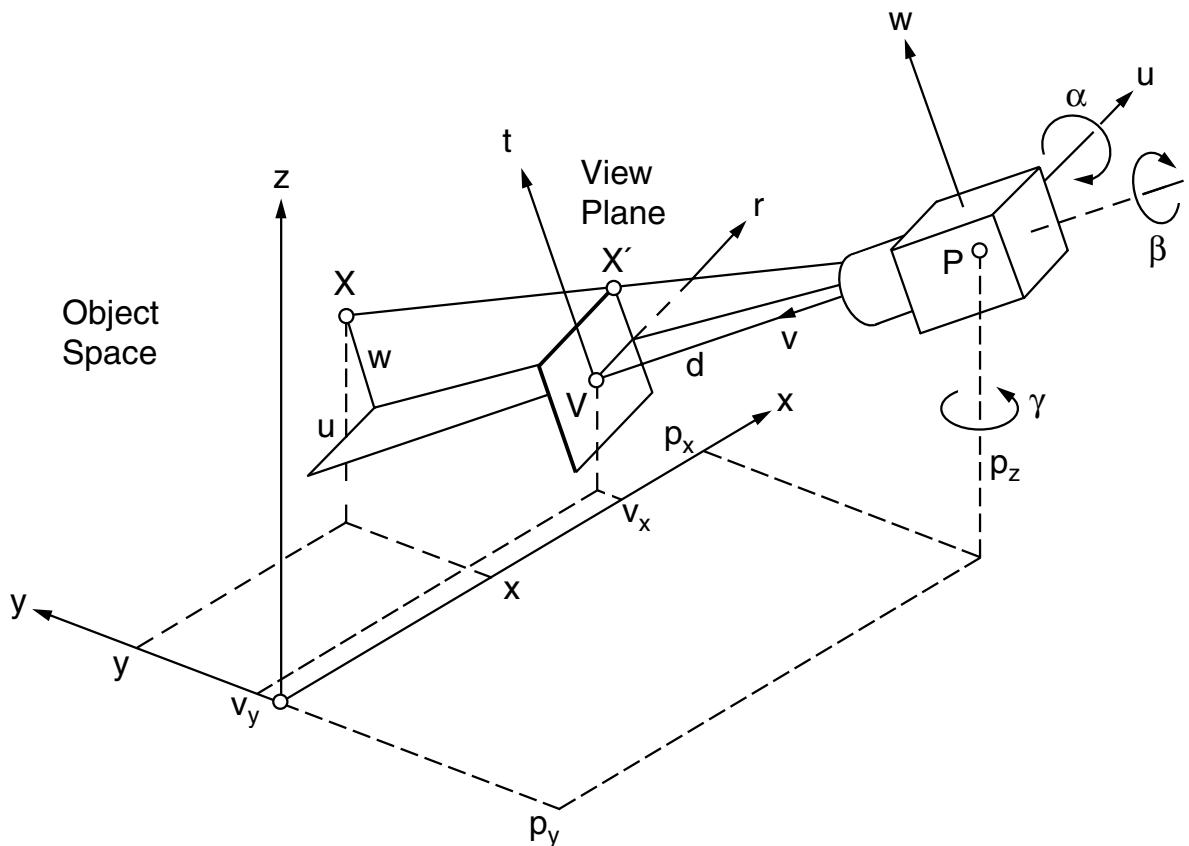


Fig. 2.6 Perspective projection

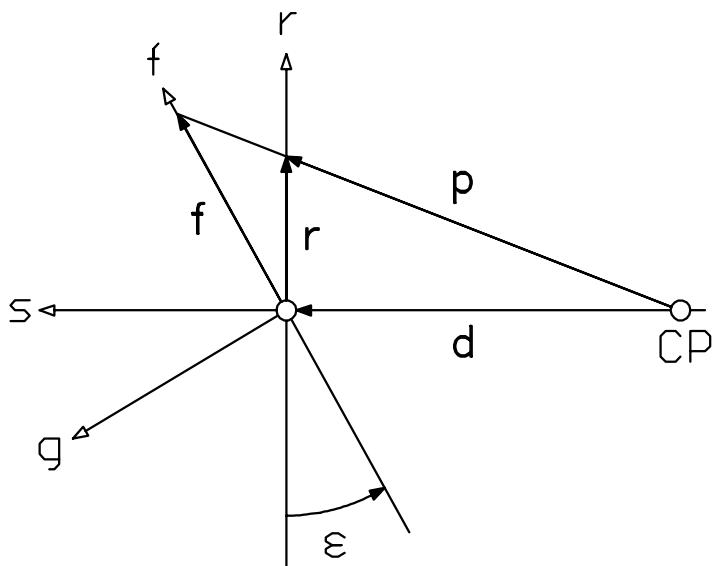


Fig. 2.7 Projection on a tilted Image Plane

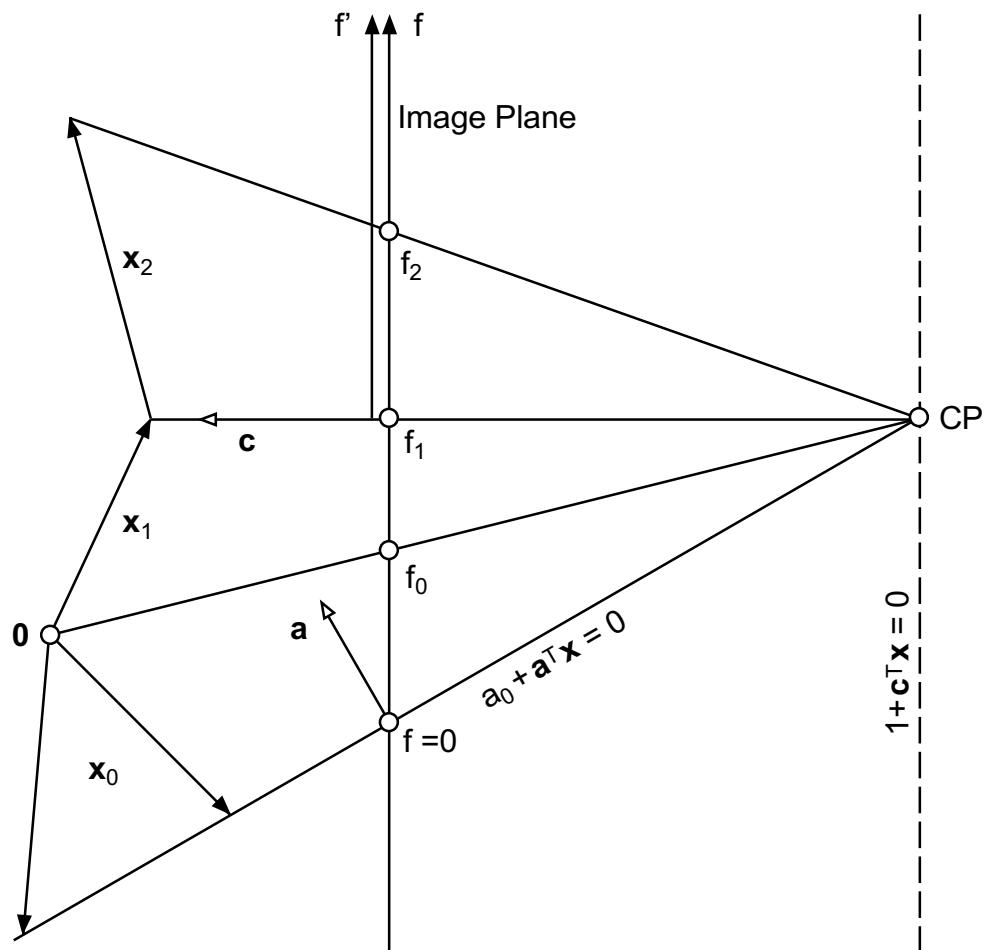


Fig. 2.8 Perspective mapping

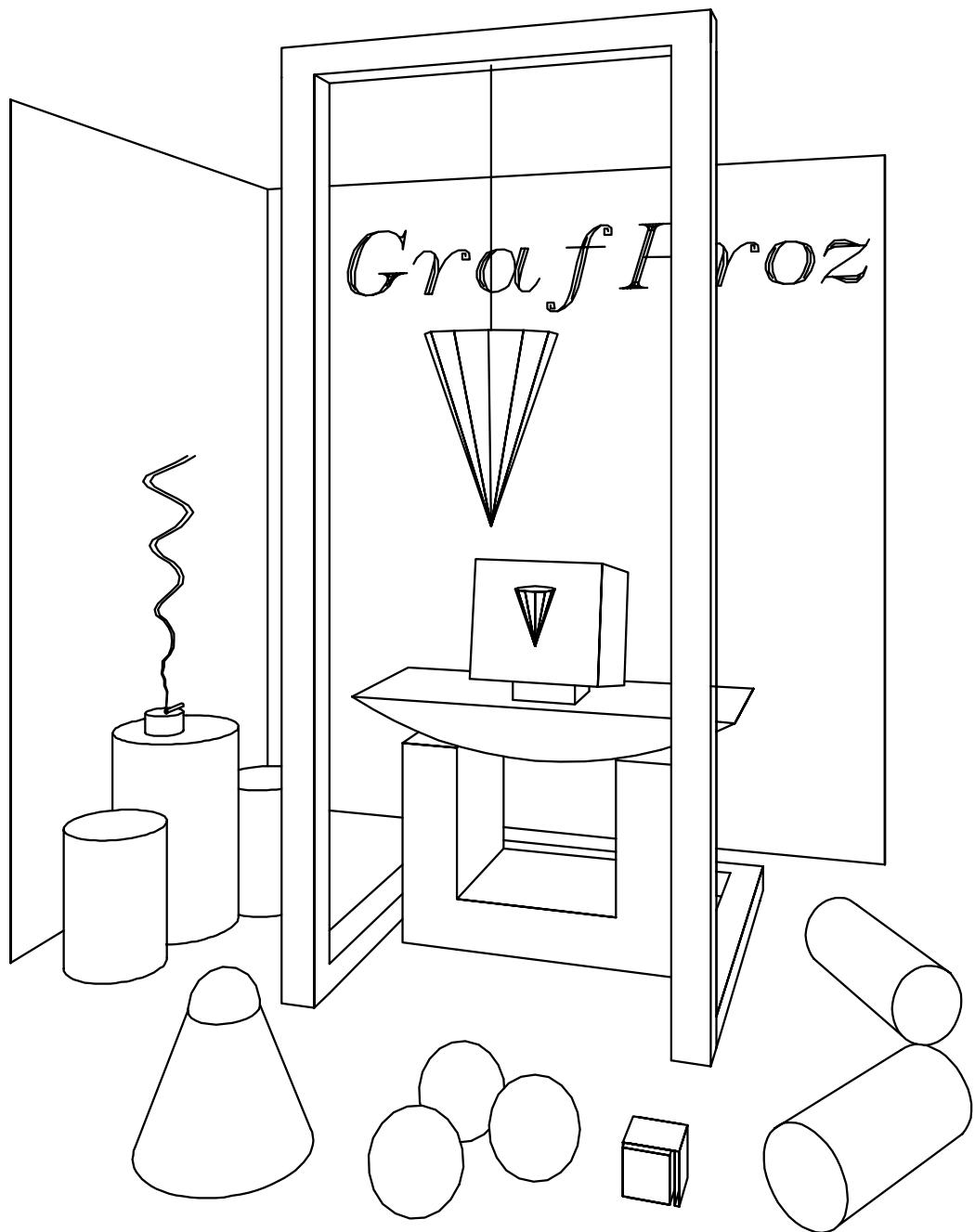


Fig. 3.1 Perspective projection with undistorted verticals

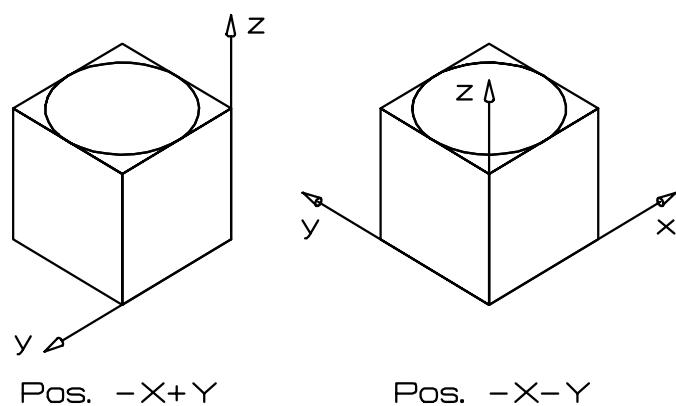
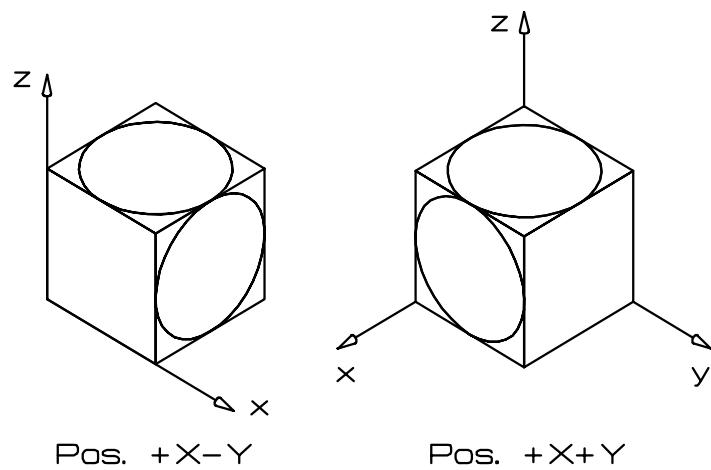


Fig. 3.2 Isometric projection

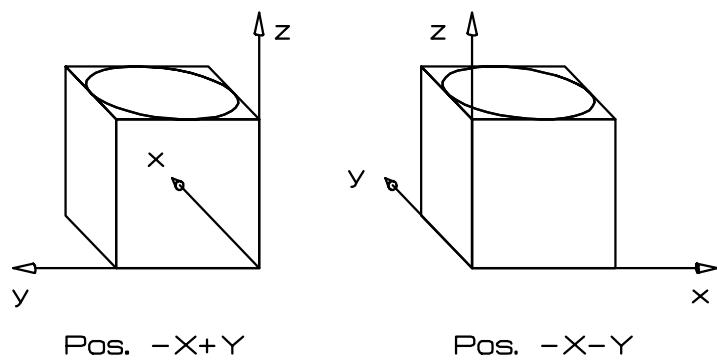
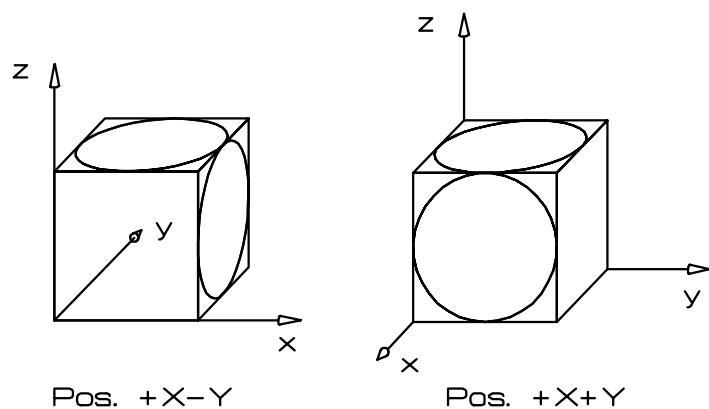


Fig. 3.2 Cabinet projection

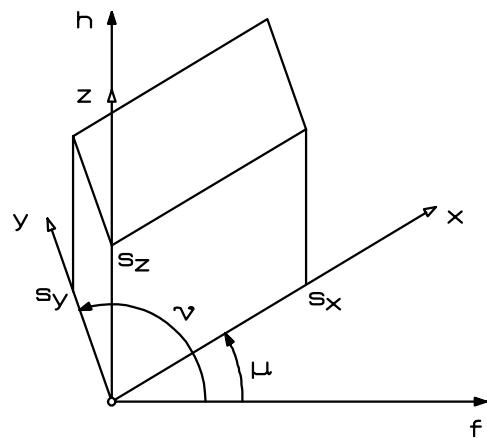


Fig. 3.3 General oblique parallel projection

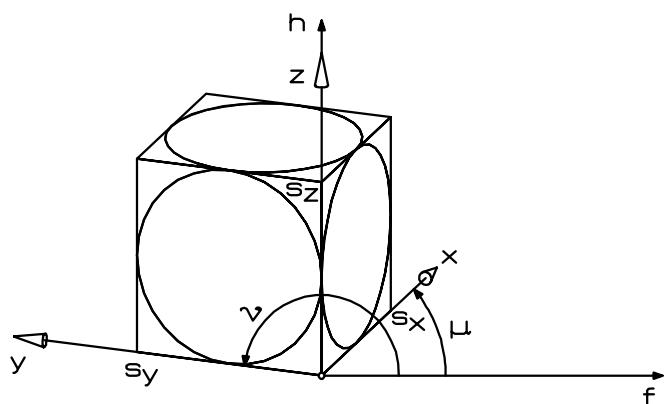


Fig. 3.4 Engineering projection

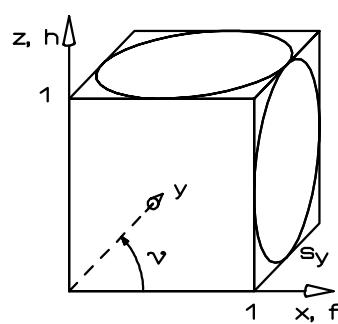


Fig. 3.5 Cabinet projection 45° , $sy=0.5$

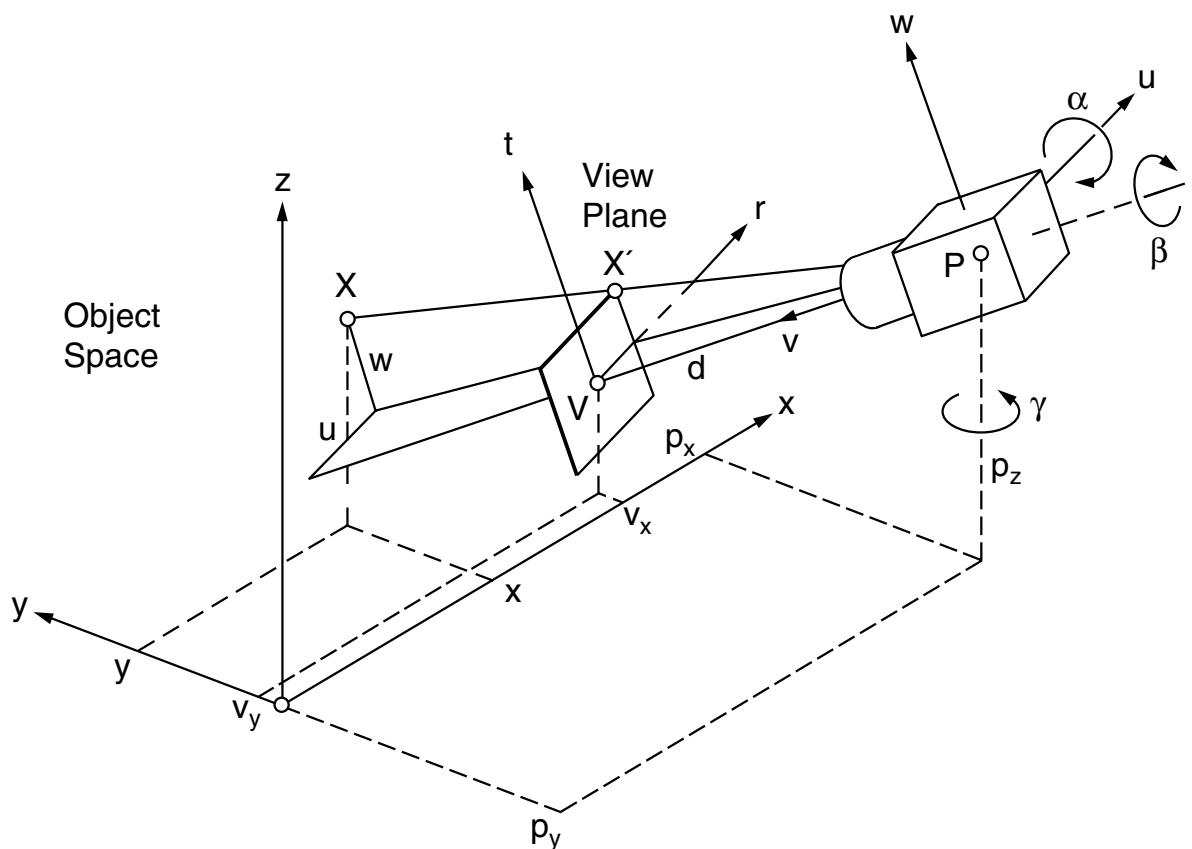


Fig. 4.1 One of two cameras for photogrammetry

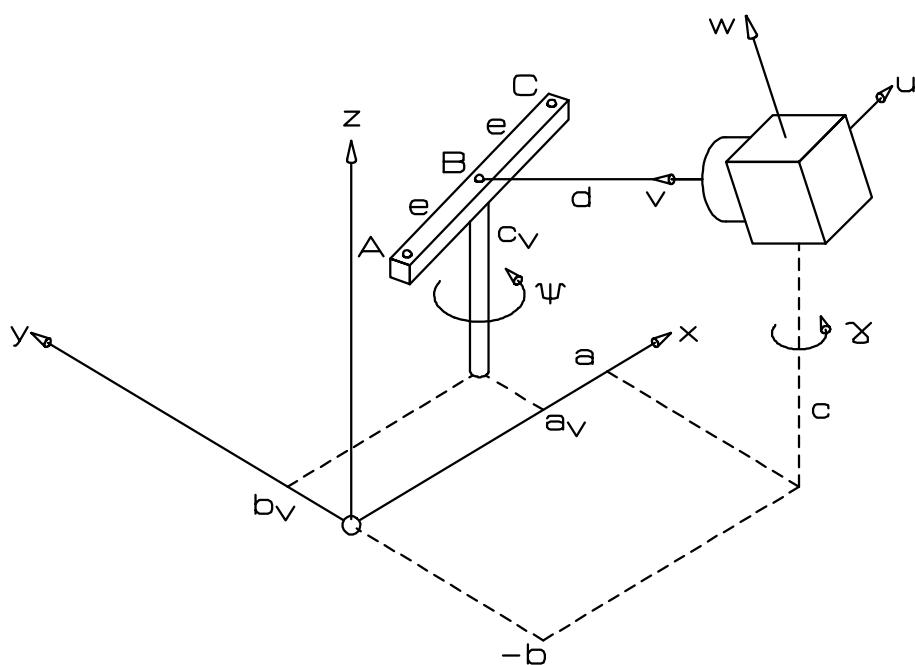


Fig. 4.2 Pragmatical identification of camera parameters

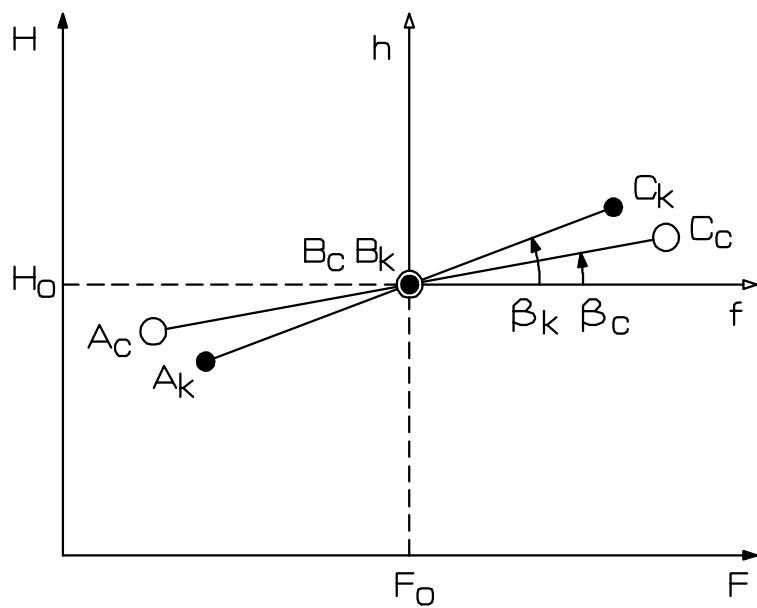


Fig. 4.3 Screen for pragmatical identification

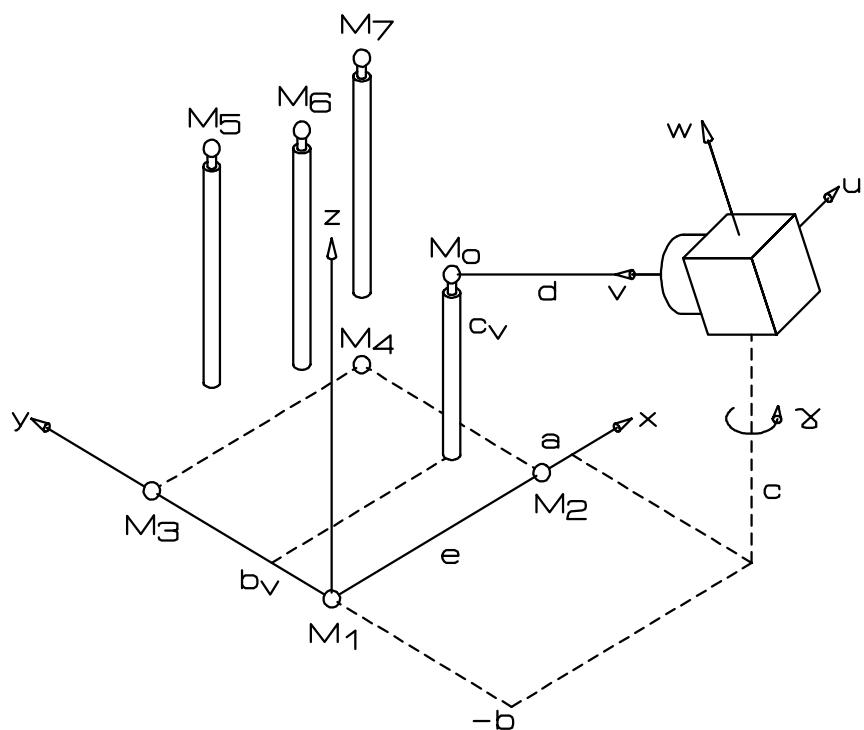


Fig. 4.4 Identification by moveable targets

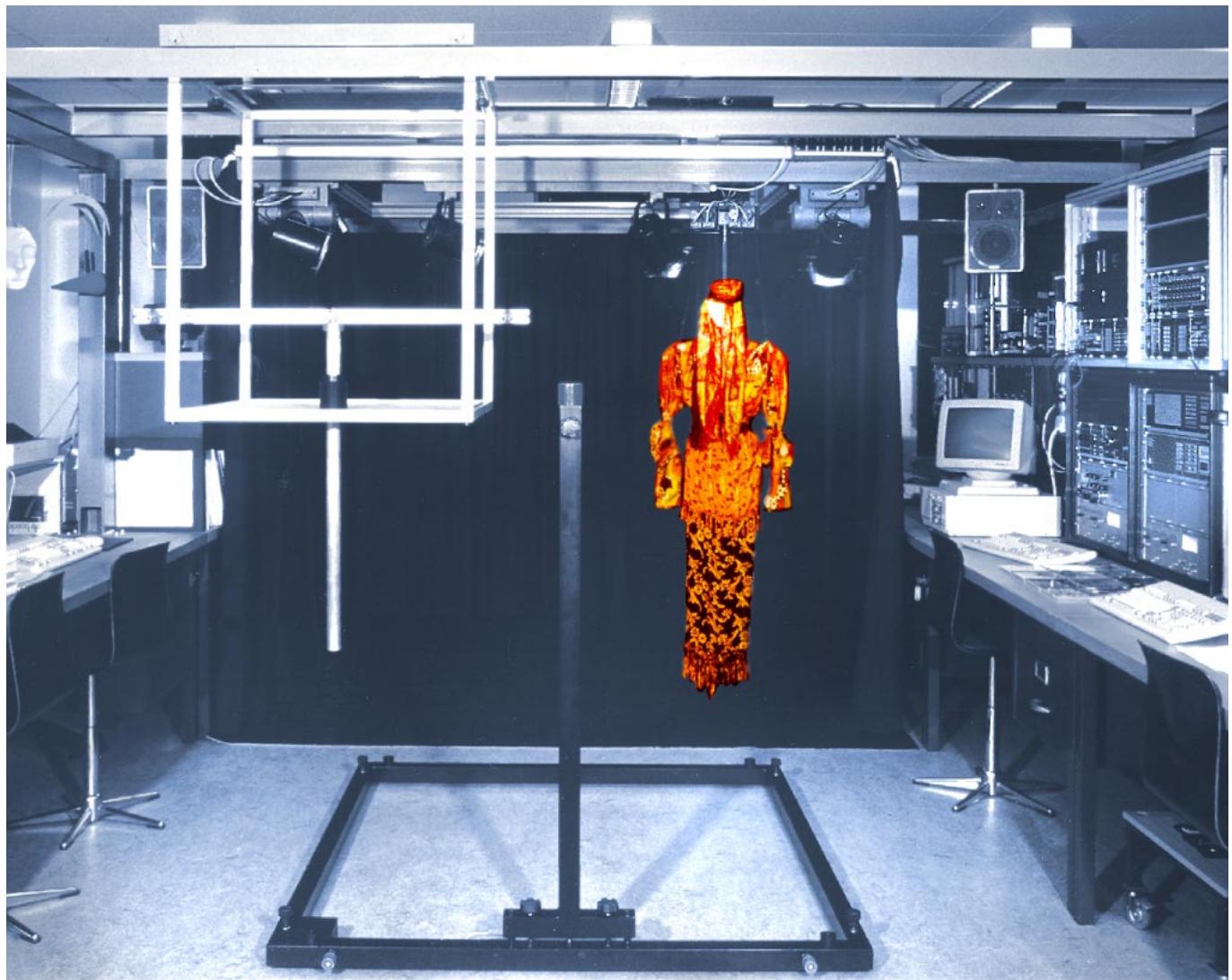


Fig. 4.5 Laboratory
Five fixed targets and one moveable triple target

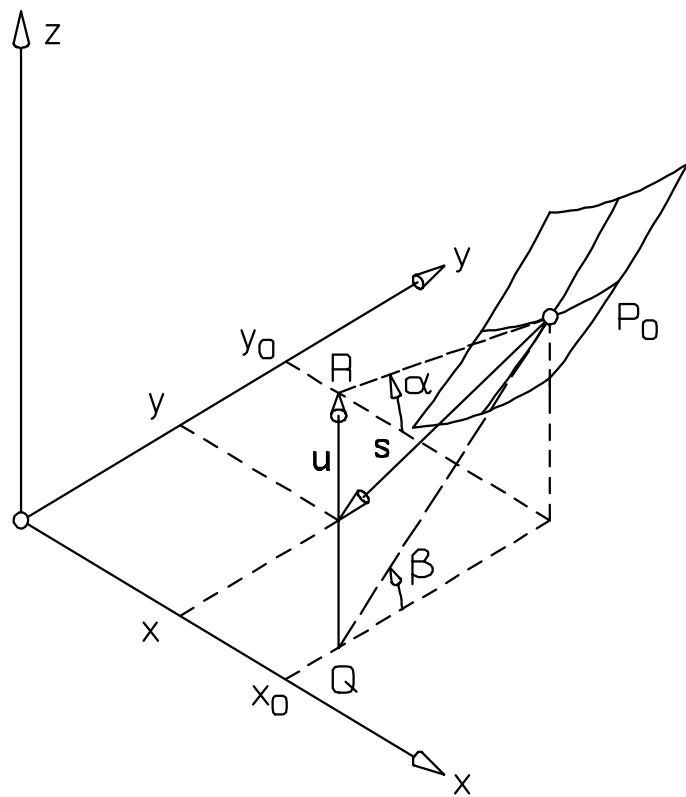


Fig. 4.6 Steepest descent minimum search

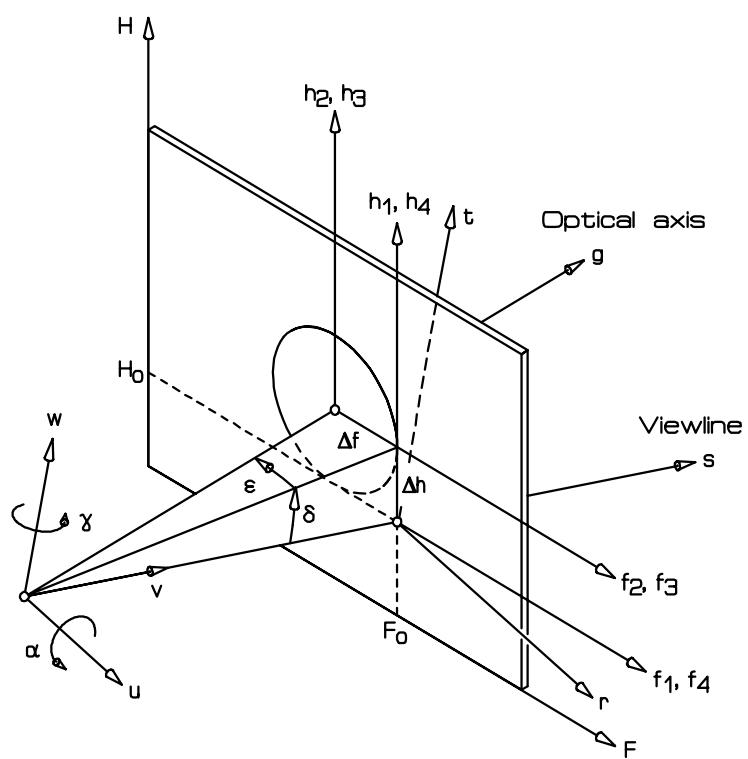


Fig. 4.7 Projection on tilted image plane

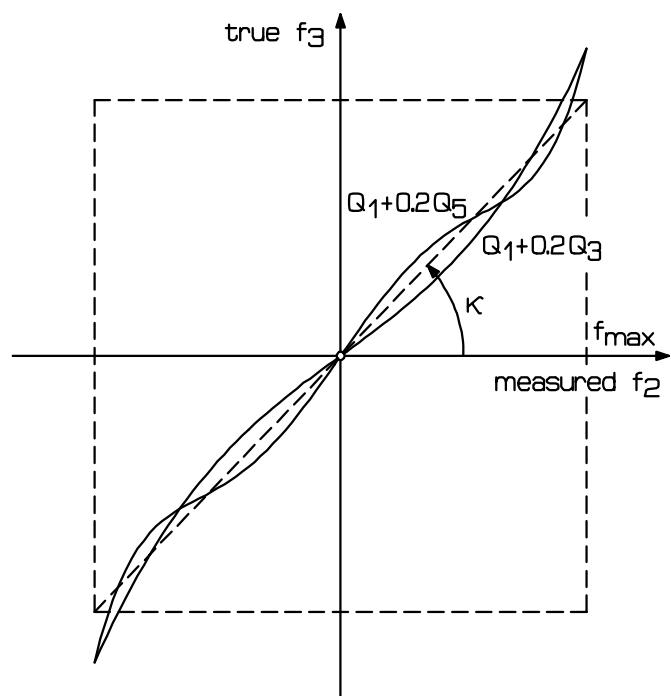


Fig. 4.8 Modeling radial distortion by Legendre polynomials

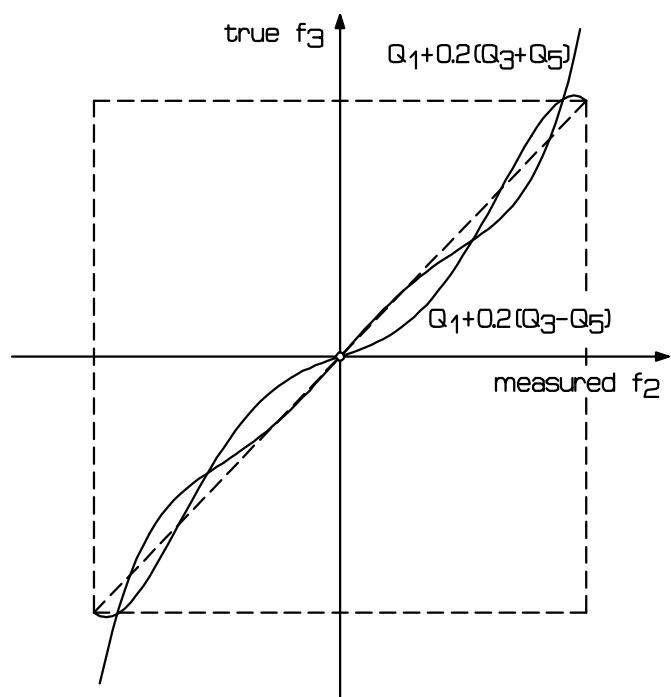


Fig. 4.9 Combination of Legendre polynomials

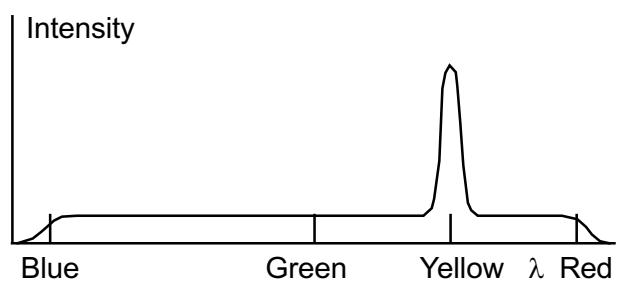
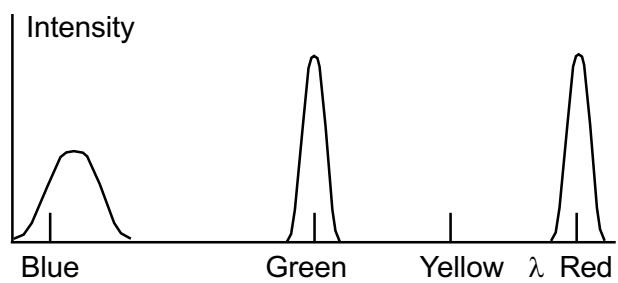
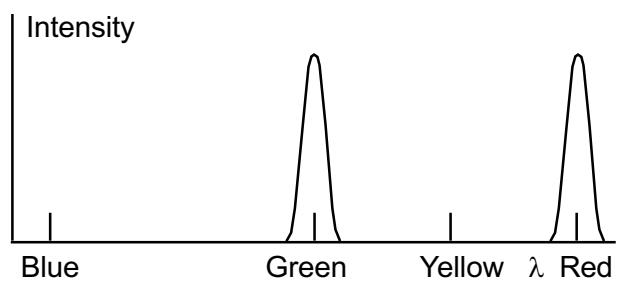
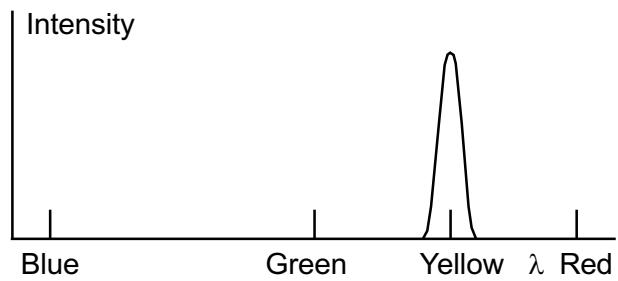


Fig. 5.1 Metamers for yellow

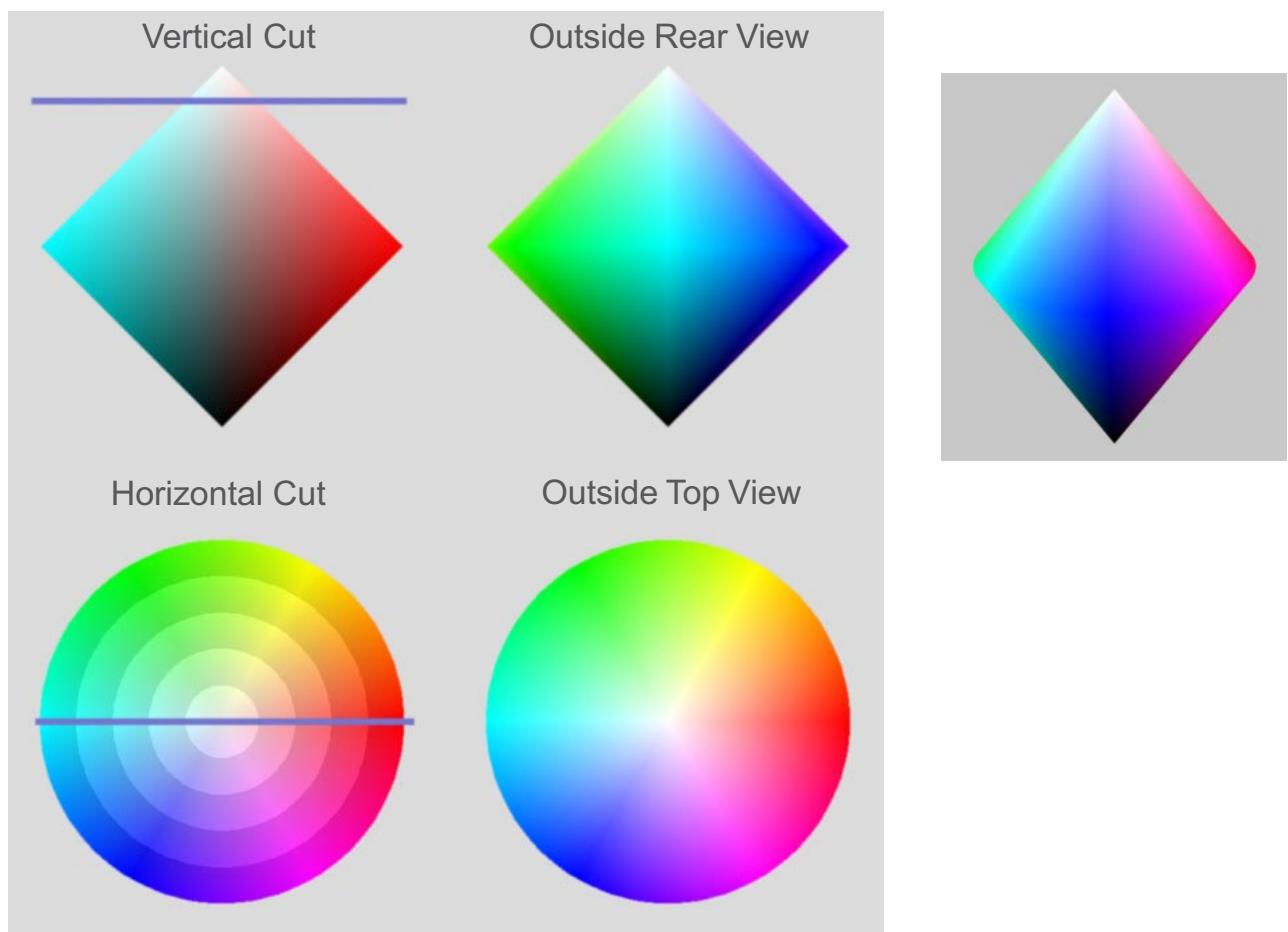
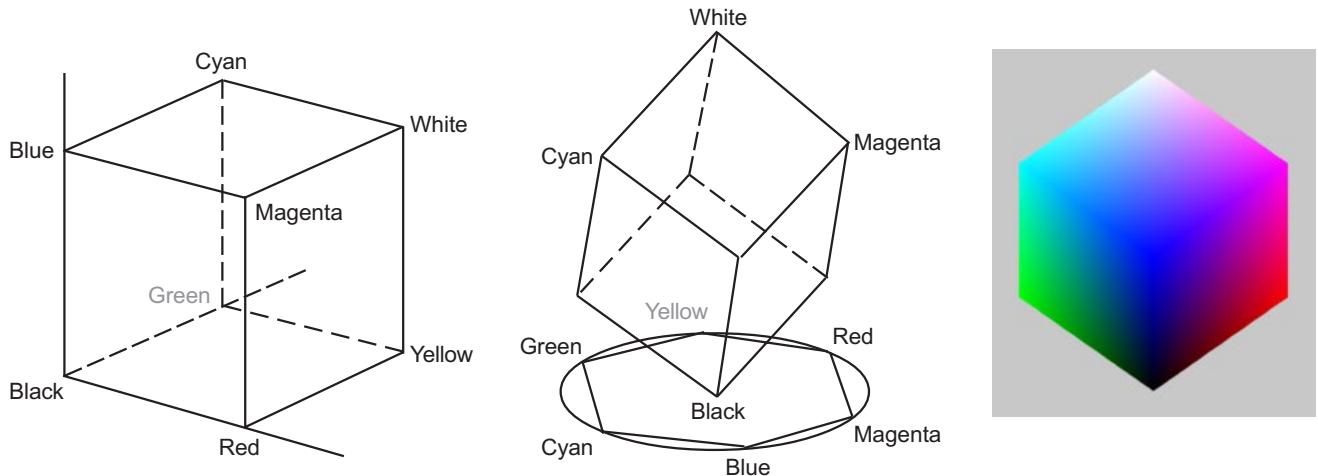


Fig. 5.2 RGB cube and HLS cone

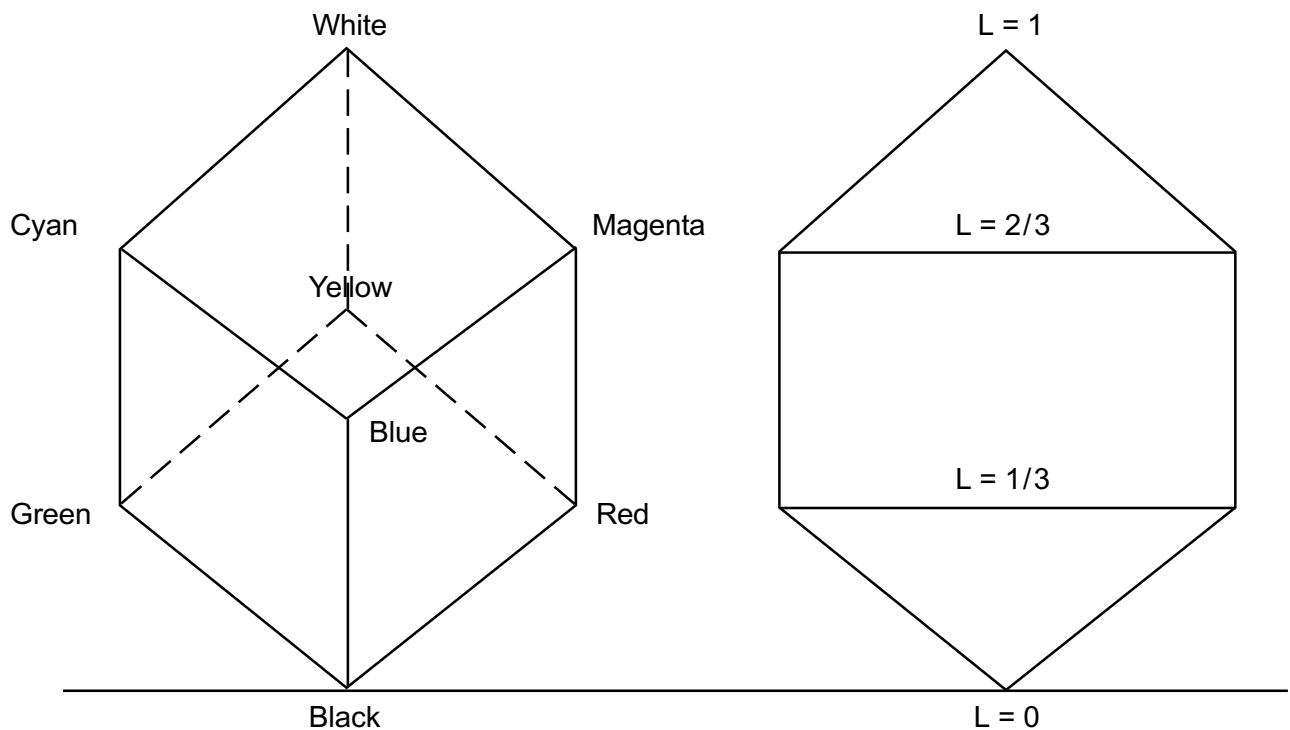


Fig. 5.3 RGB cube and HLS-Hoffmann cone

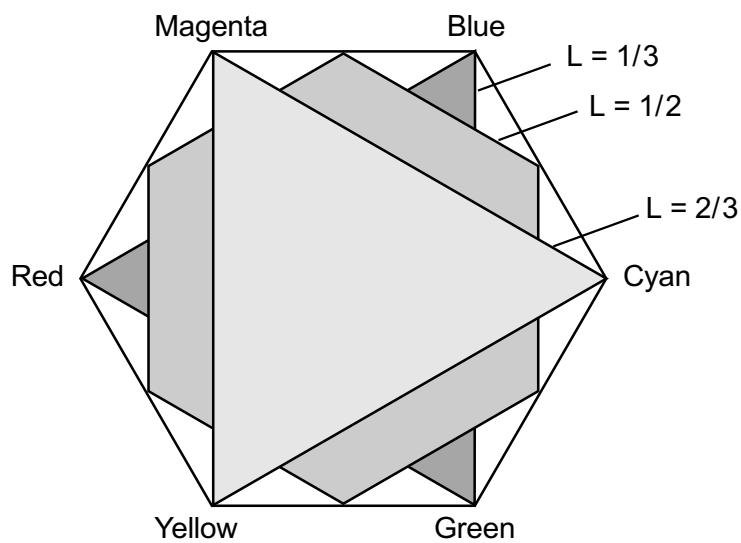


Fig. 5.4 Planes of constant lightness

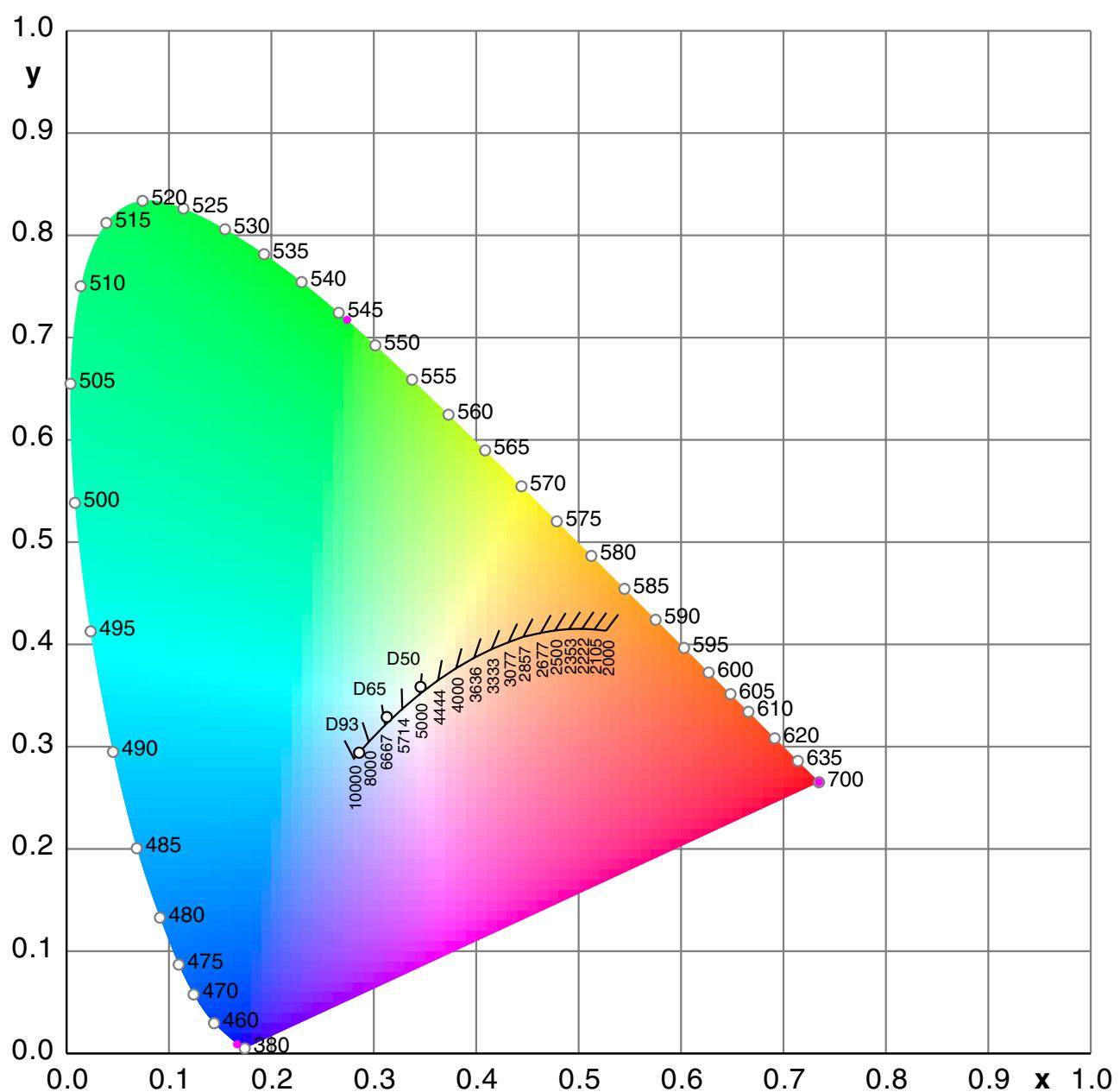


Fig. 5.5 CIE (1931) chromaticity diagram

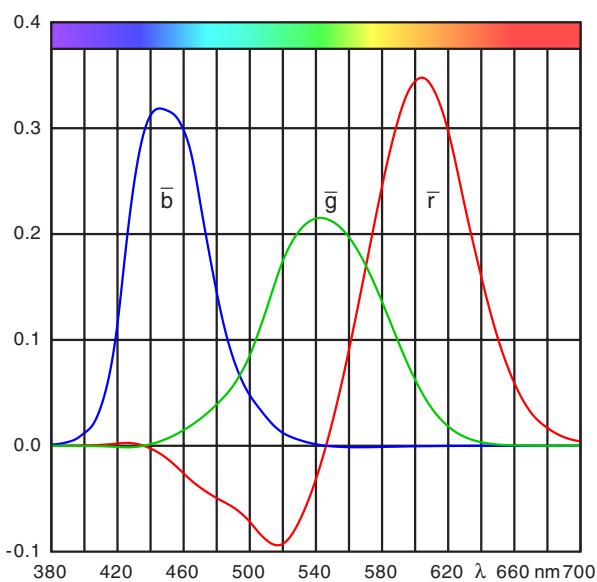


Fig. 5.6a CIE color matching functions RGB

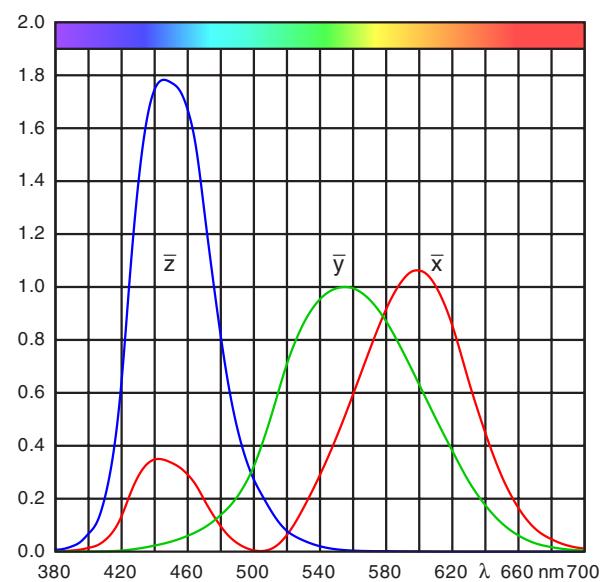


Fig. 5.6b CIE color matching functions XYZ

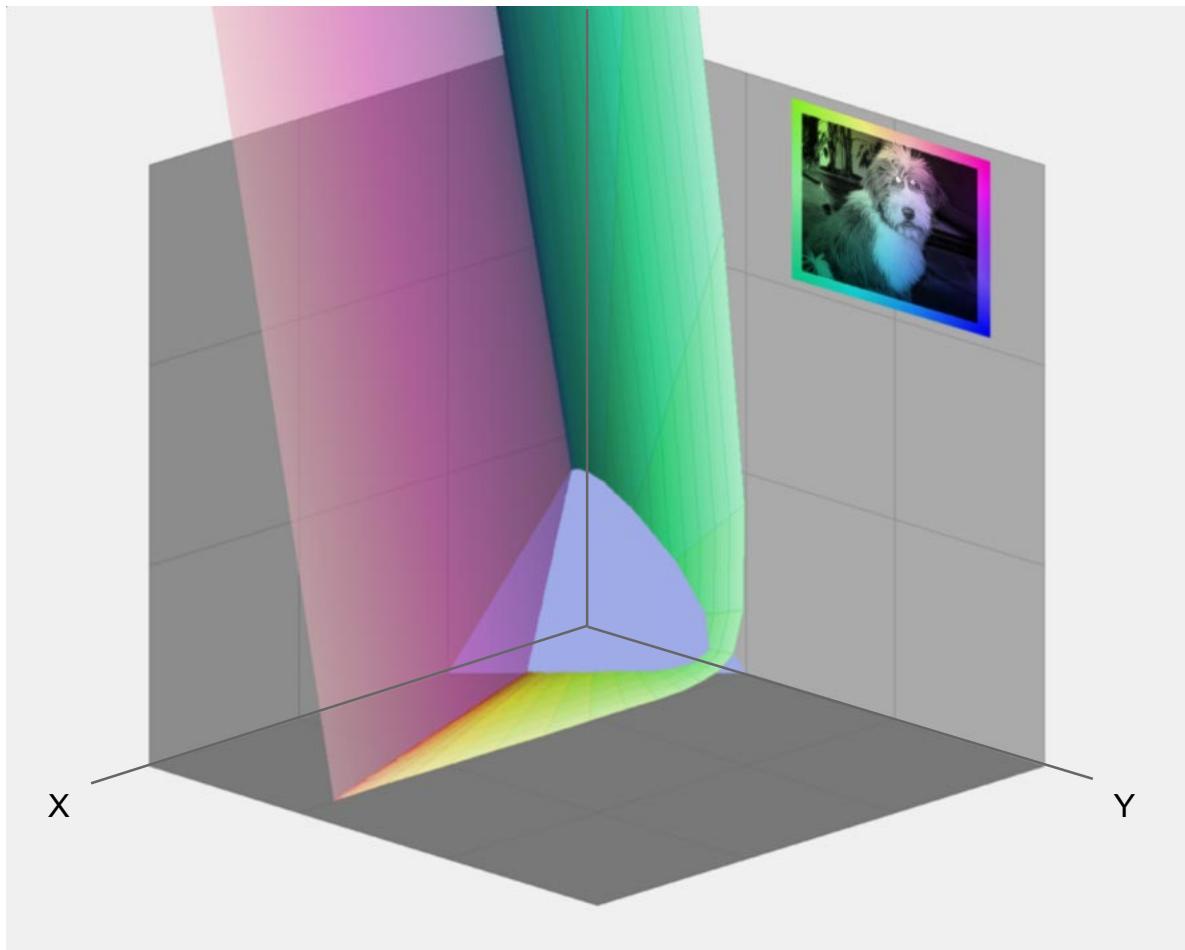


Fig. 5.7 CIE XYZ color space

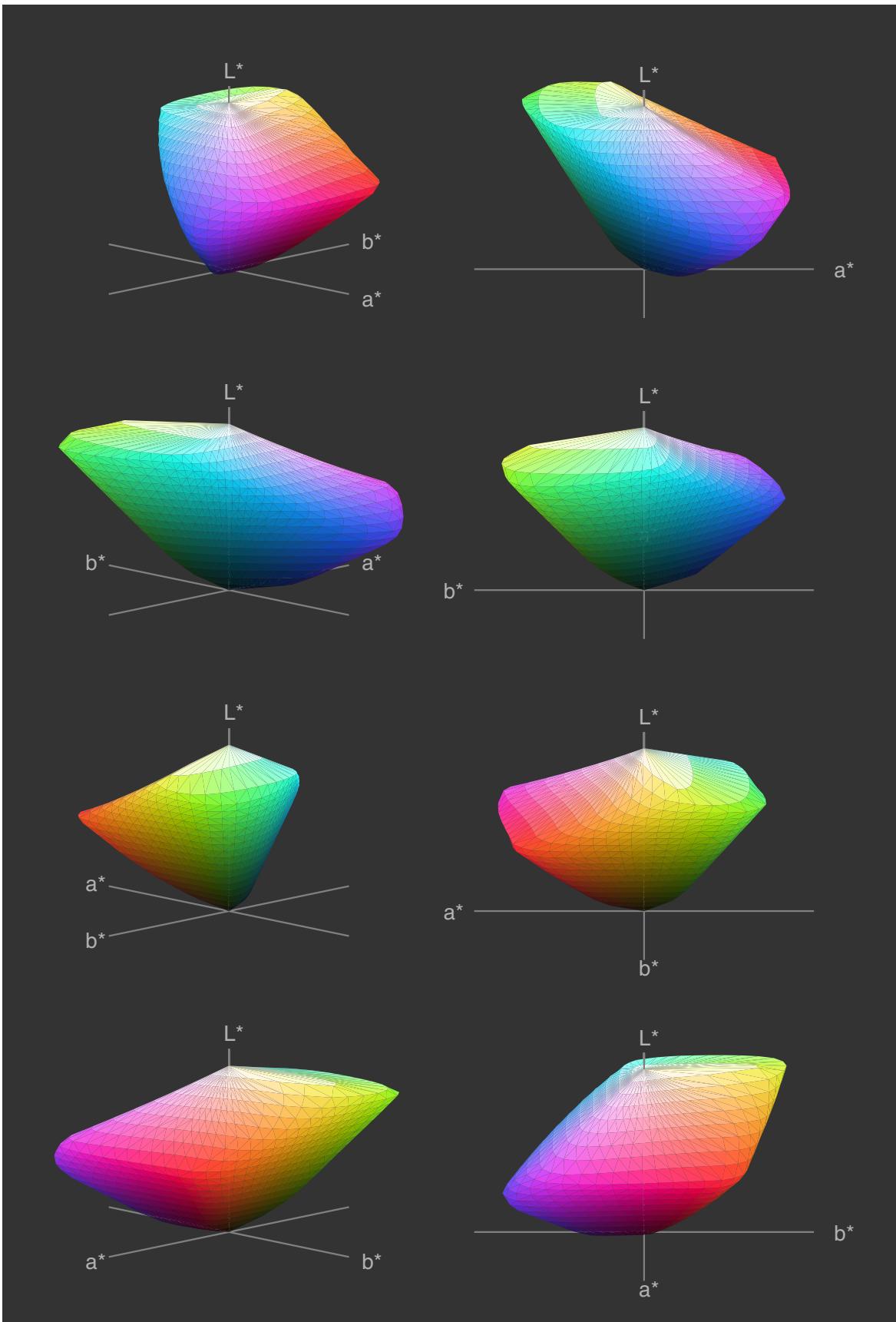


Fig. 5.8 CIELab color space for RGB colors

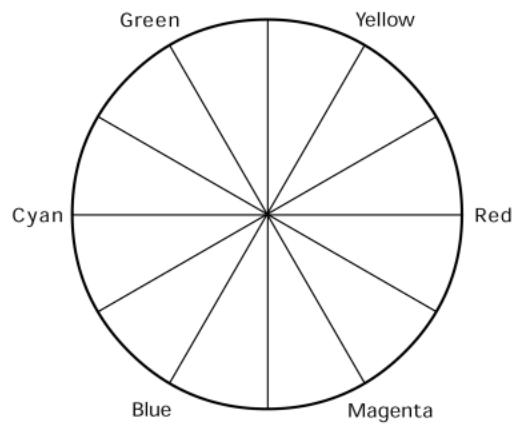


Fig. 5.9 Color wheel

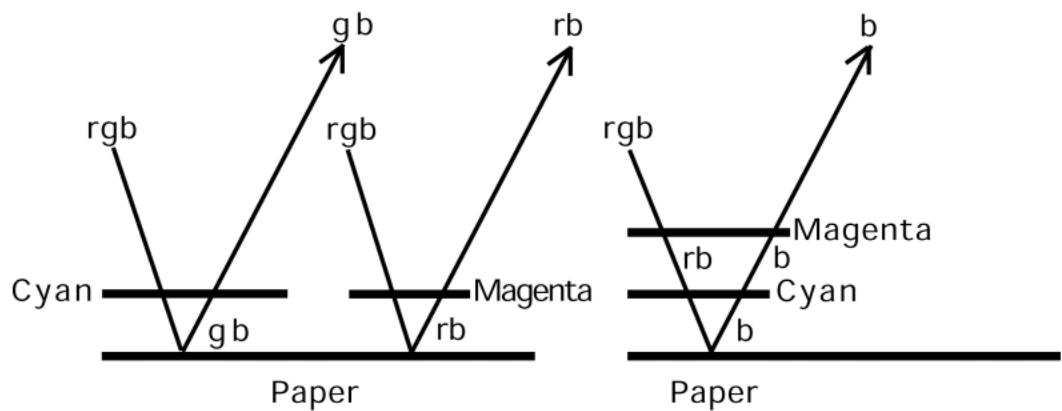


Fig. 5.10 Printing CMYK

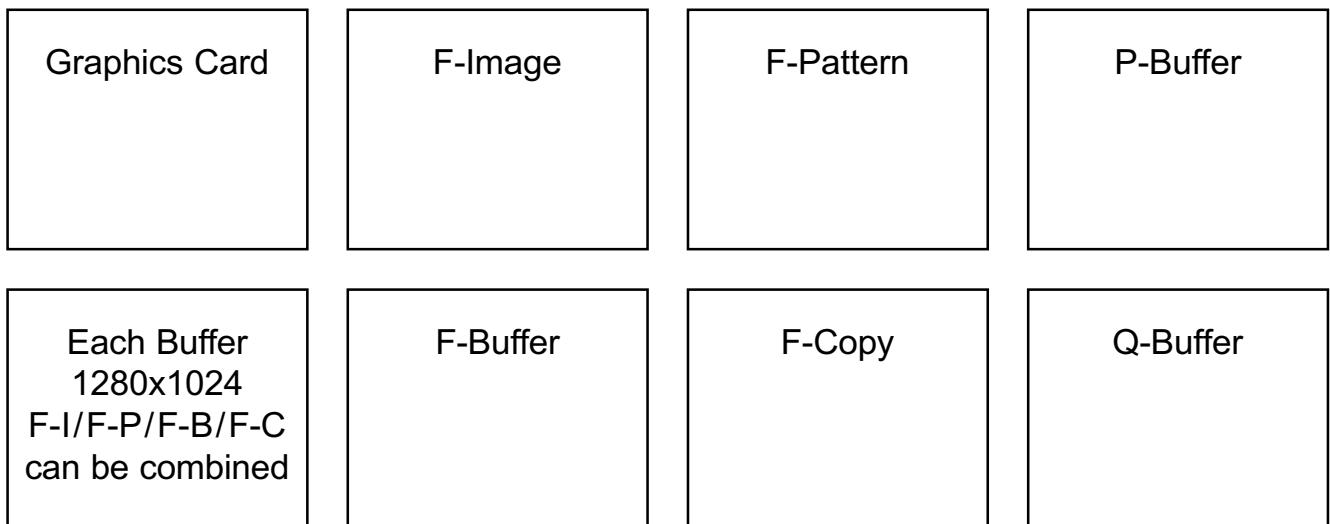


Fig. 6.1 Memory organization for ZEBRA and ZEFIR

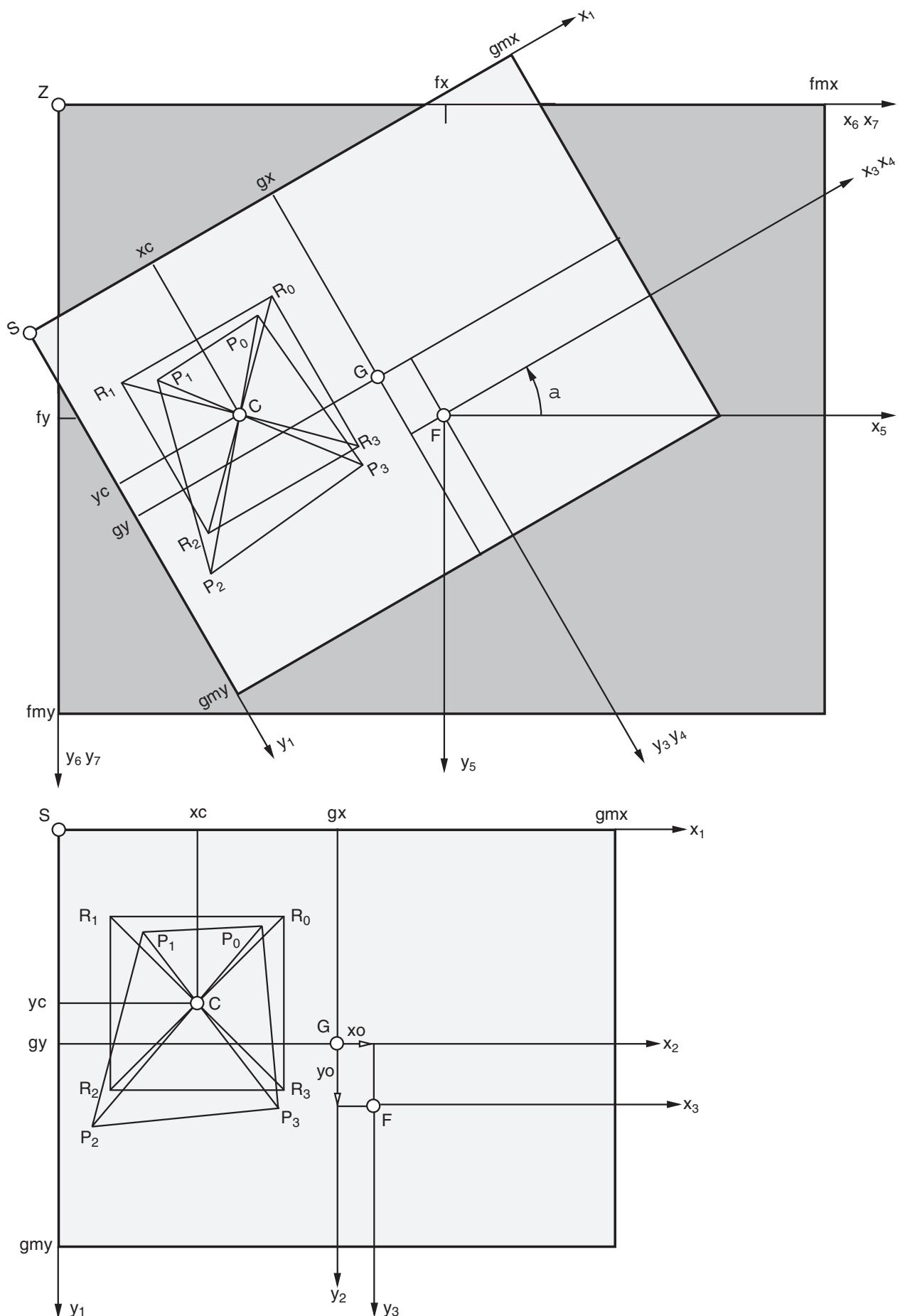


Fig. 6.2 Geometry transformations

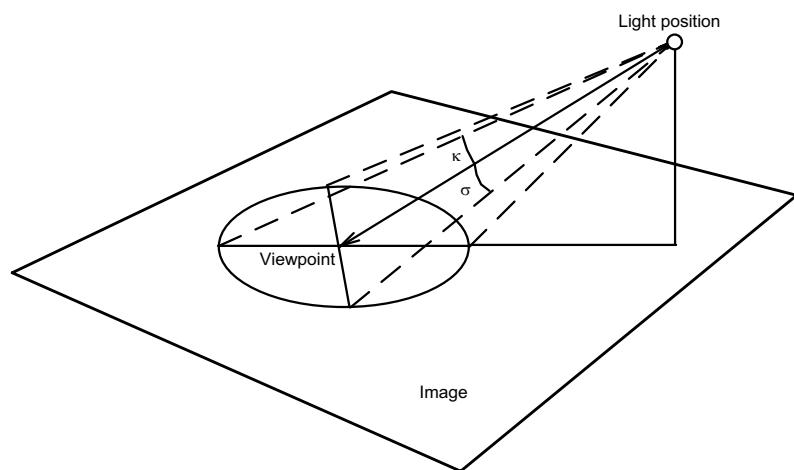


Fig. 6.3 Light effects

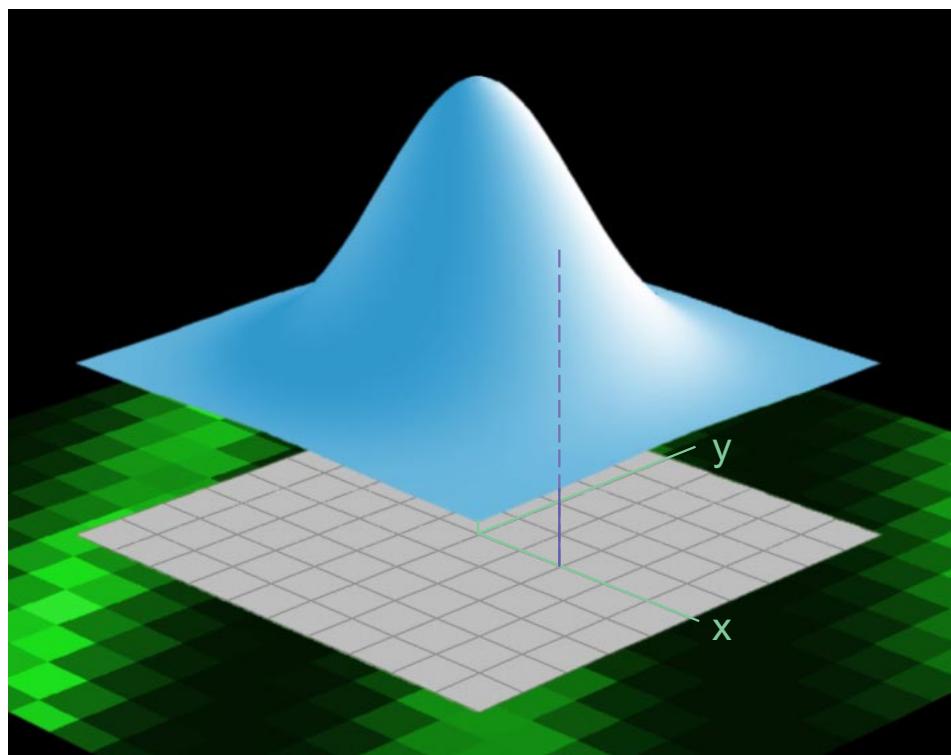


Fig. 6.4 Filter weight function

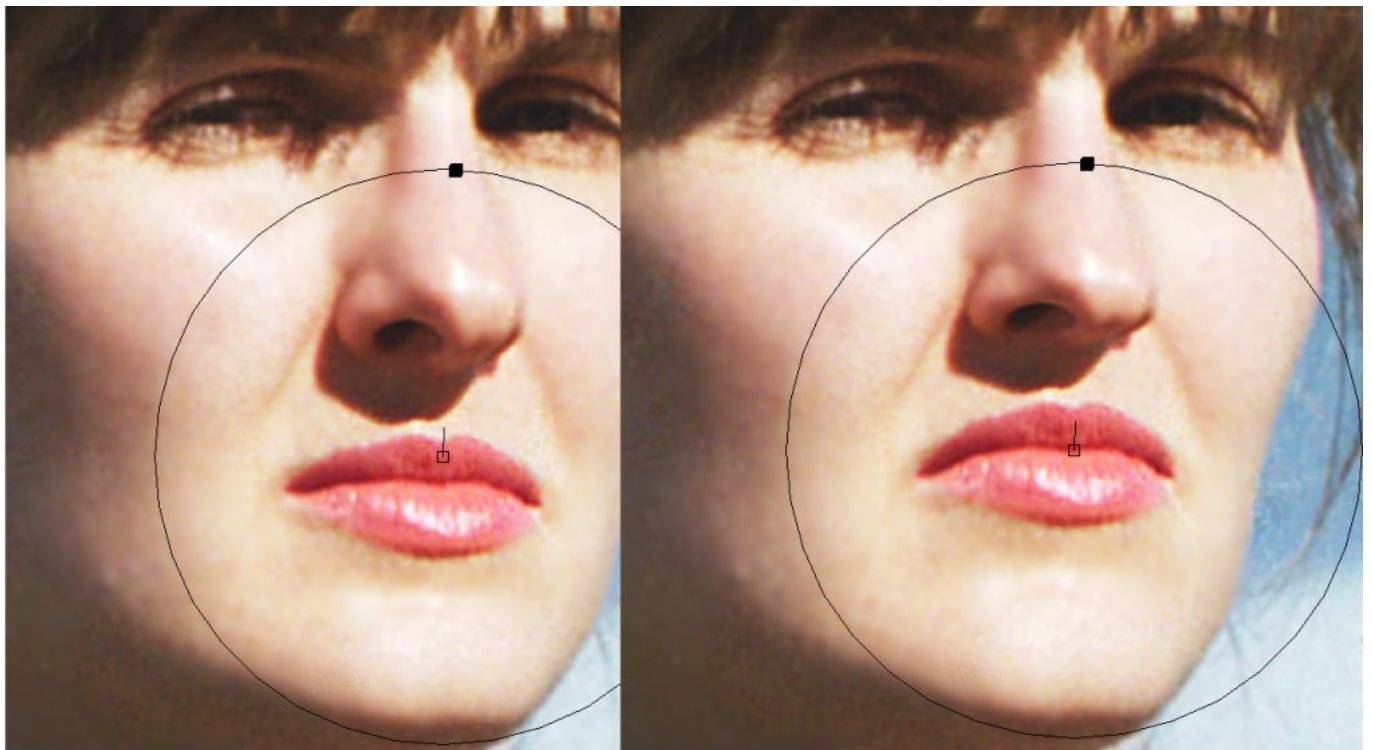


Fig. 6.5 Distortion shift linear (PDF zoom 200%)

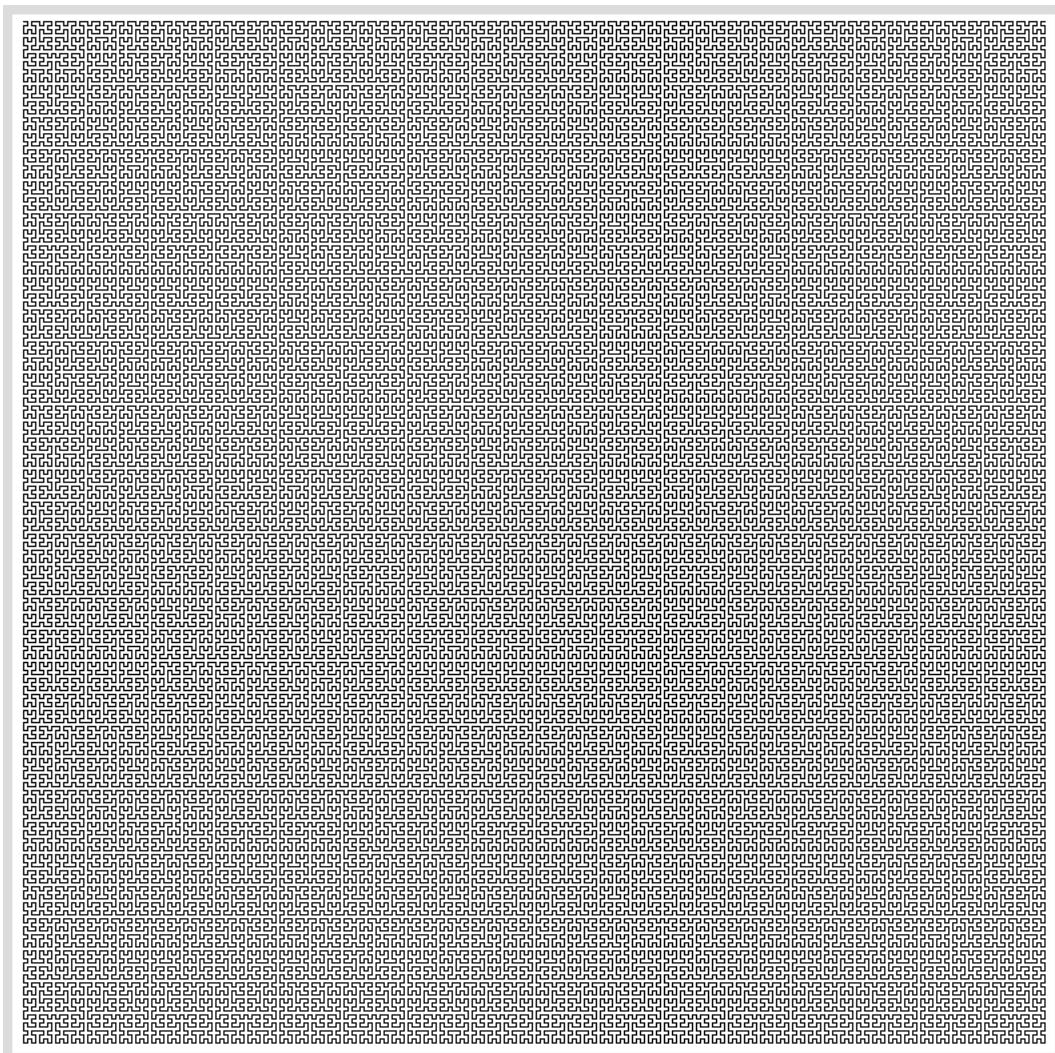


Fig. 6.6 Hilbert-Peano curve 256x256 (PDF zoom 200%)

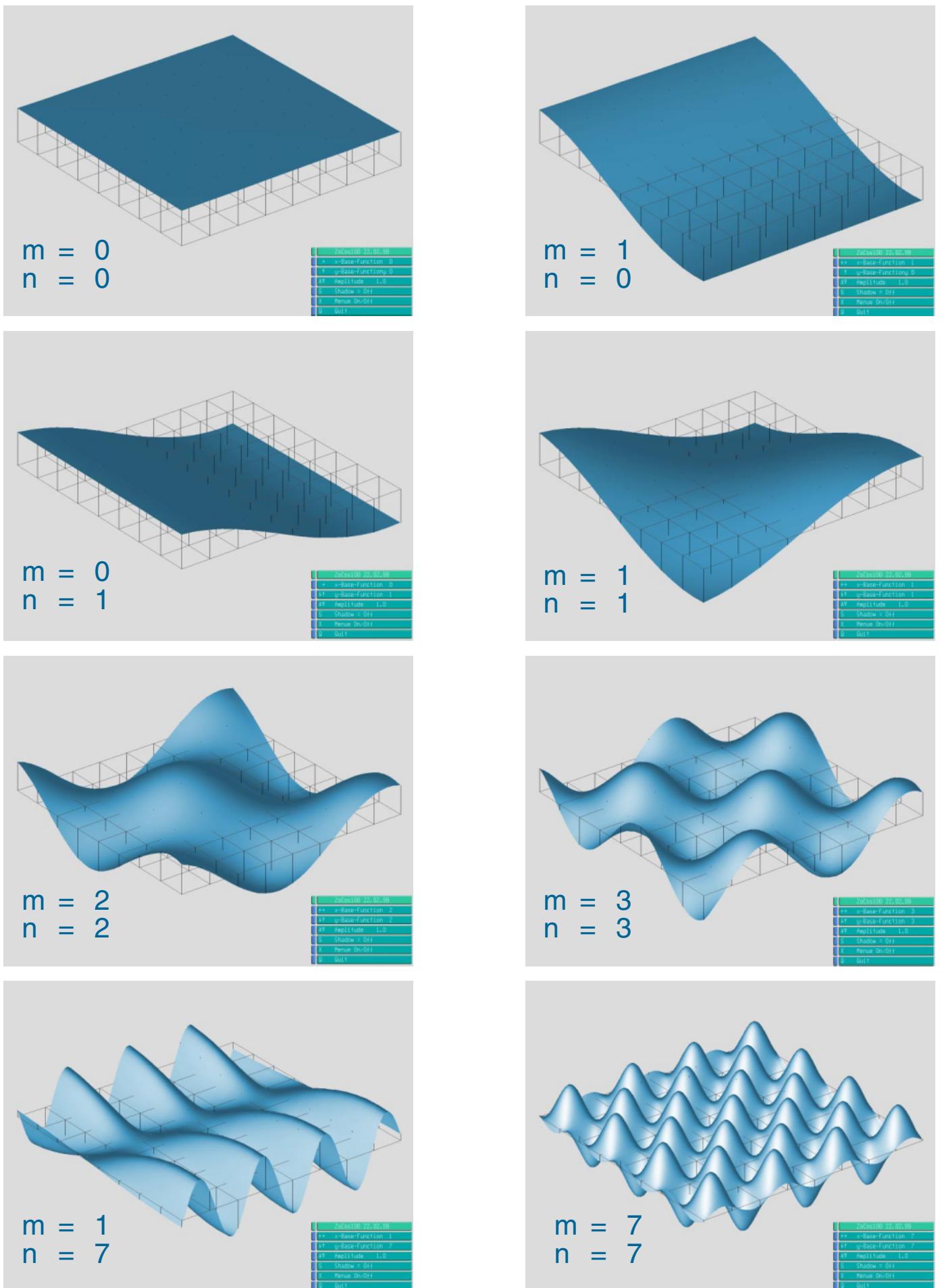


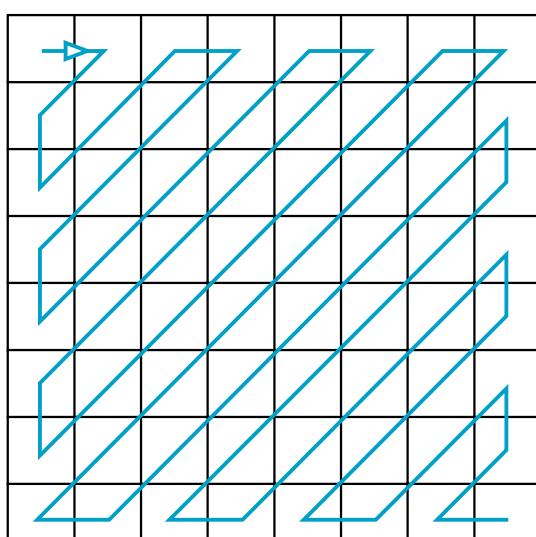
Fig. 6.7 Discrete cosine transformation, 8 of 64 basic functions

K ₀₀	K ₁₀	K ₂₀	K ₃₀	K ₄₀	K ₅₀	K ₆₀	K ₇₀
K ₀₁	K ₁₁	K ₂₁	K ₃₁	K ₄₁	K ₅₁	K ₆₁	K ₇₁
K ₀₂	K ₁₂	K ₂₂	K ₃₂	K ₄₂	K ₅₂	K ₆₂	K ₇₂
K ₀₃	K ₁₃	K ₂₃	K ₃₃	K ₄₃	K ₅₃	K ₆₃	K ₇₃
K ₀₄	K ₁₄	K ₂₄	K ₃₄	K ₄₄	K ₅₄	K ₆₄	K ₇₄
K ₀₅	K ₁₅	K ₂₅	K ₃₅	K ₄₅	K ₅₅	K ₆₅	K ₇₅
K ₀₆	K ₁₆	K ₂₆	K ₃₆	K ₄₆	K ₅₆	K ₆₆	K ₇₆
K ₀₇	K ₁₇	K ₂₇	K ₃₇	K ₄₇	K ₅₇	K ₆₇	K ₇₇

DCT - Coefficients

16	11	10					61
12	12	14					55
14	13	16					56
72	92	95					99

Y - Quantization Table



ZigZag Table

17	18	24	47	99			99
18	21	26	66	99			99
24	26	56	99				99
47	66	99					
99	99						
99	99	99					99

CbCr - Quantization Table

Fig. 6.8-6.11 JPEG functions

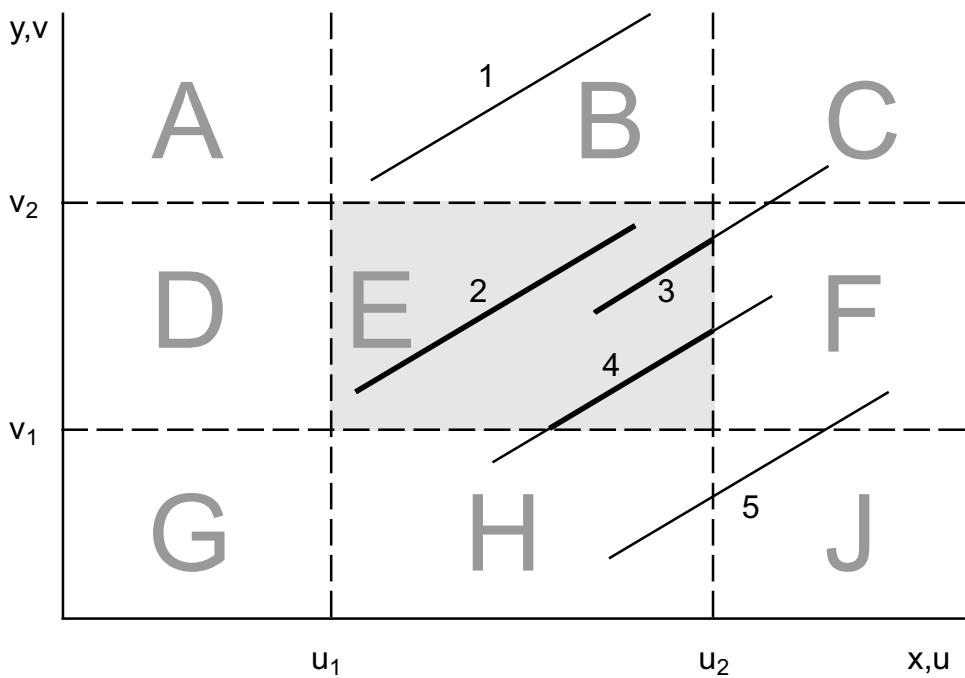


Fig. 7.1 Clipping

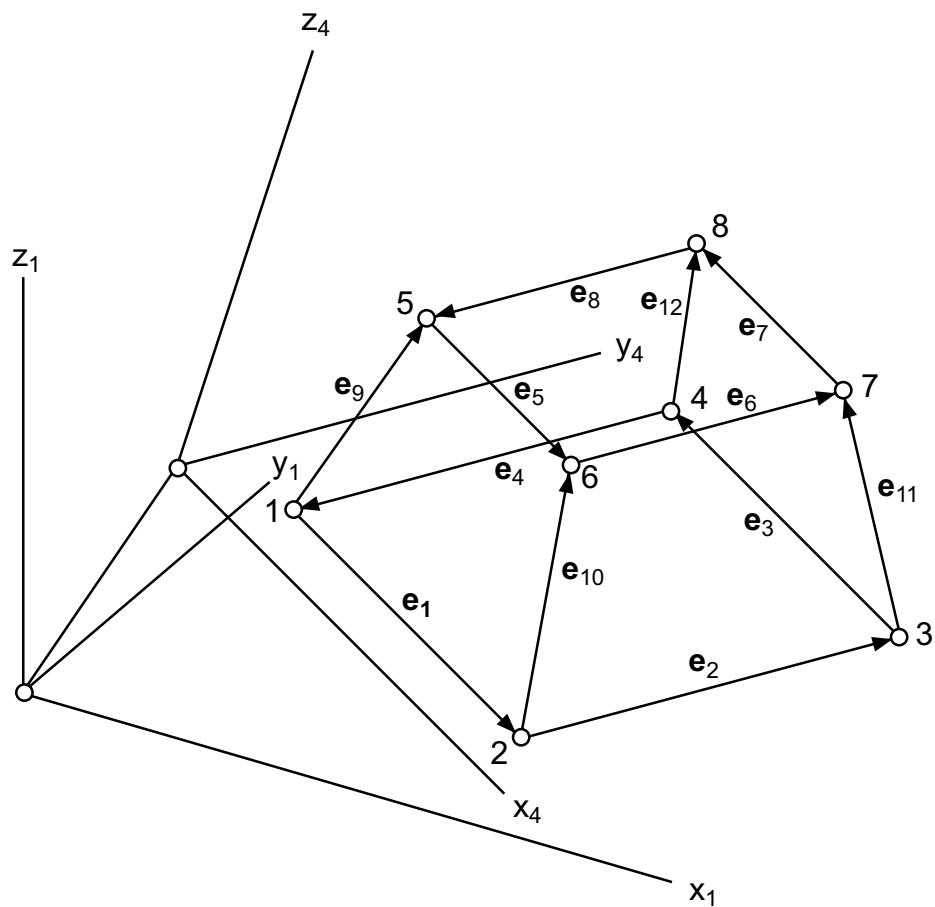


Fig. 7.2 Cube by cube pyramid prototype

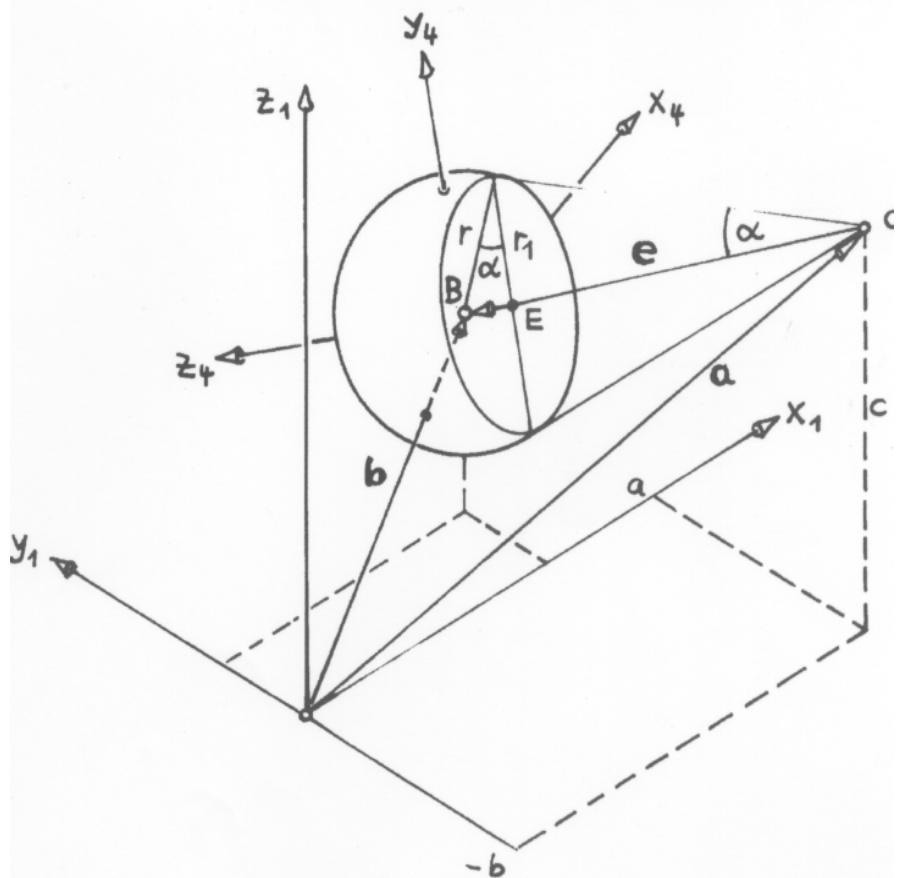
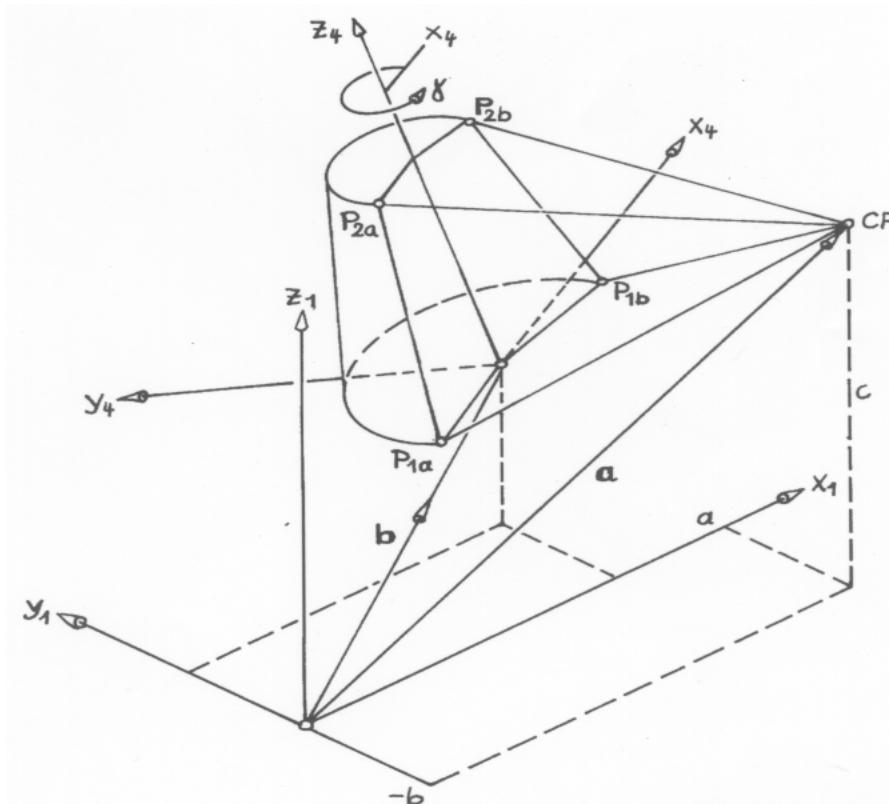


Fig. 7.3 Contour points of sphere



For vector graphics:

Helvetica normal 12pt
e.g. a, x₁, x₄, P_{1a}, CP

Helvetica bold 12pt
e.g. **a**, **b**

Symbol normal 12pt
e.g. γ

Adjust exponent and
index properly

Fit corners

Fig. 7.4 Contour points of double elliptic cone

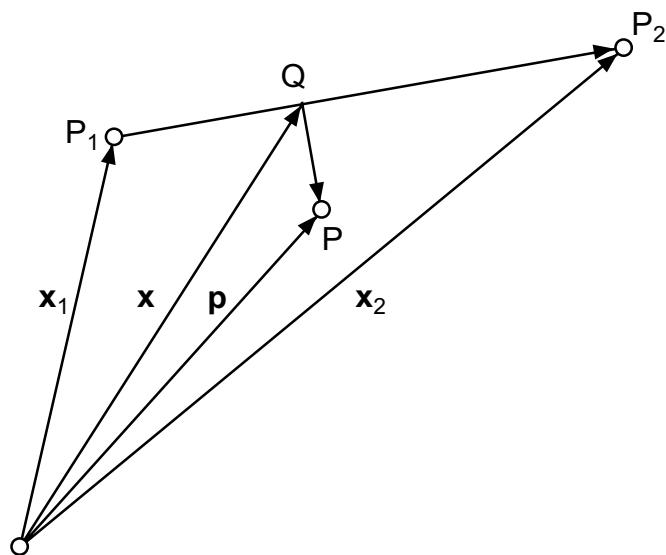


Fig. 7.5 Picking a vector

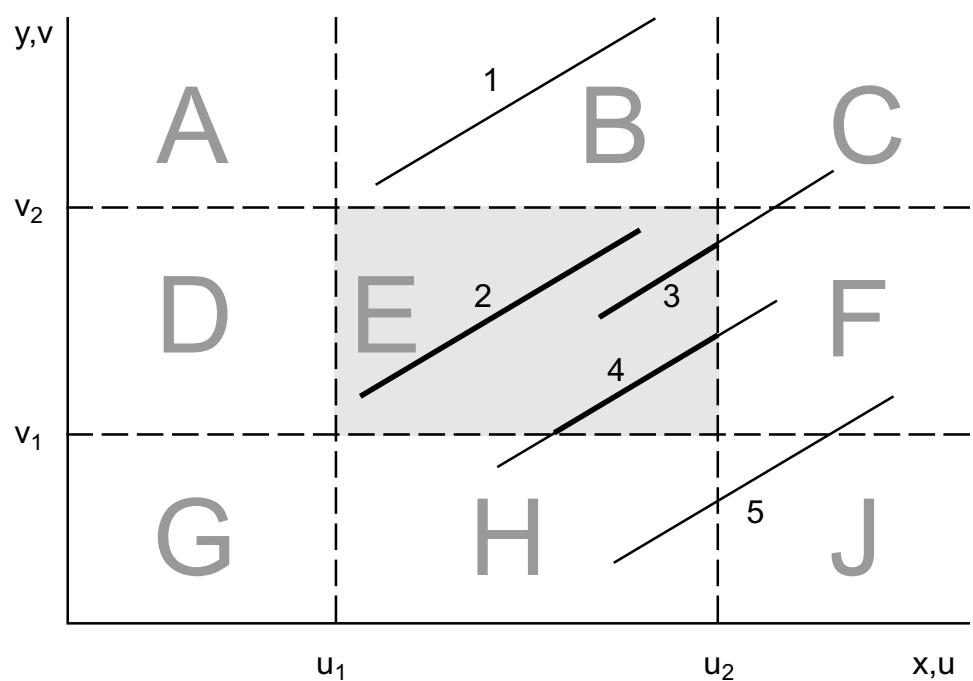


Fig. 7.6 Inframe and outframe vectors

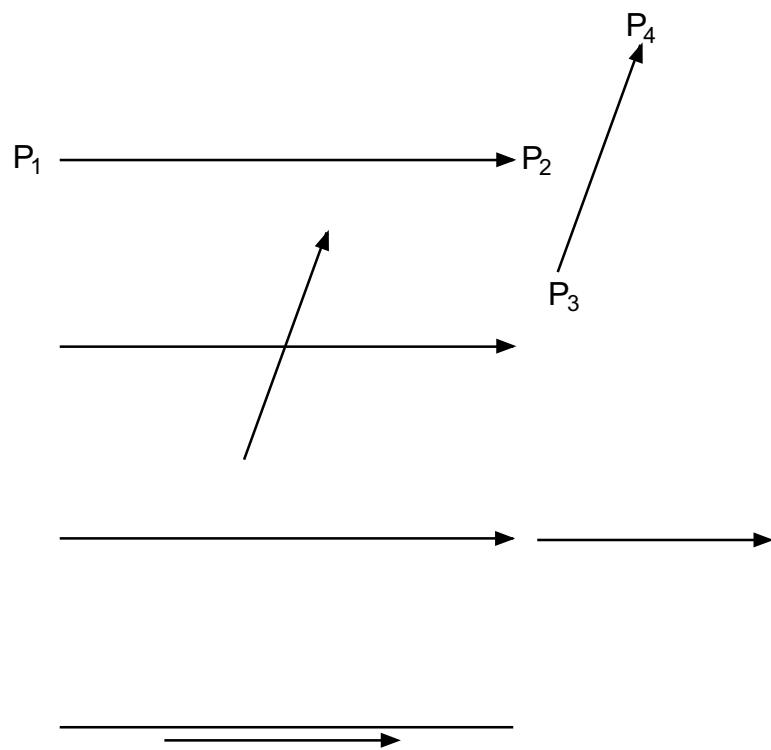


Fig. 7.7 Inside and outside vectors

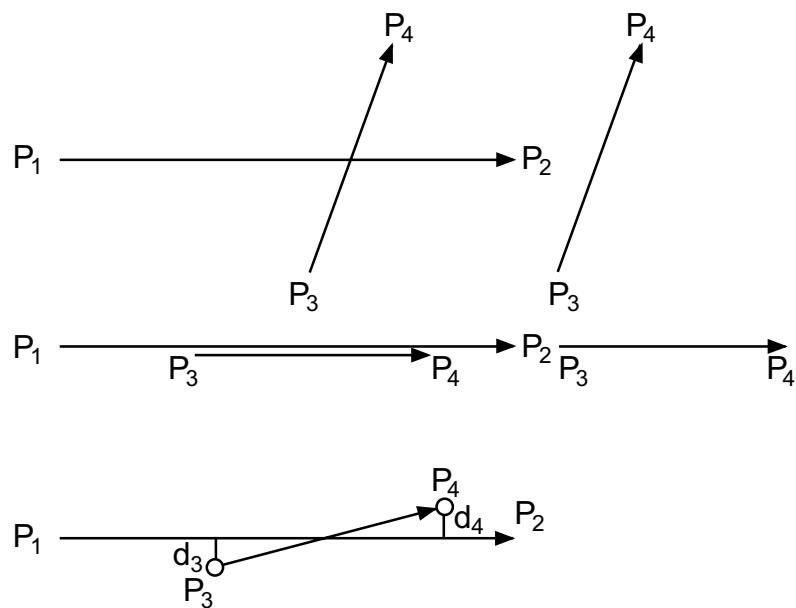


Fig. 7.8 Inline and outline vectors

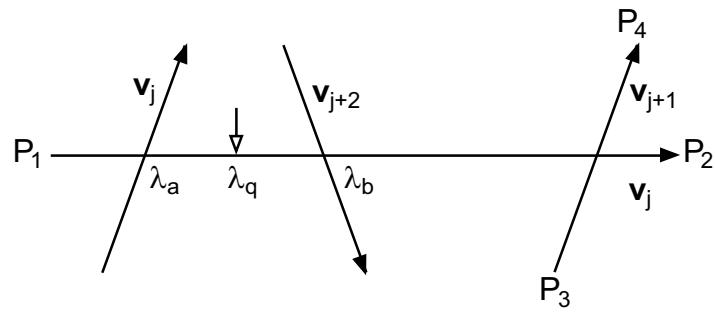


Fig. 7.9 Outline-inside intersections

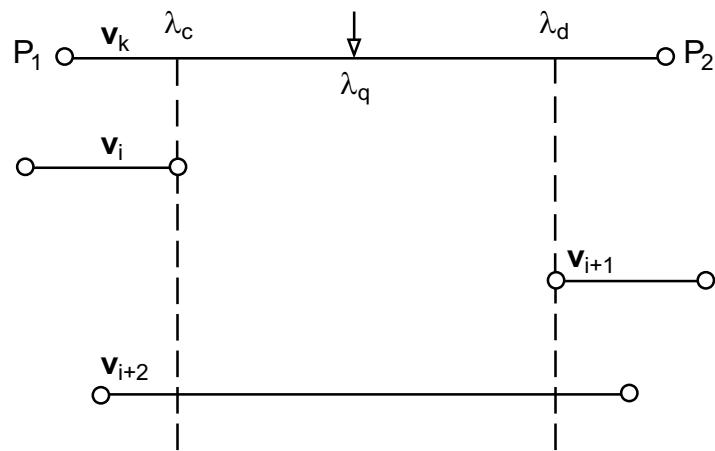


Fig. 7.10 Inline-inside intersections

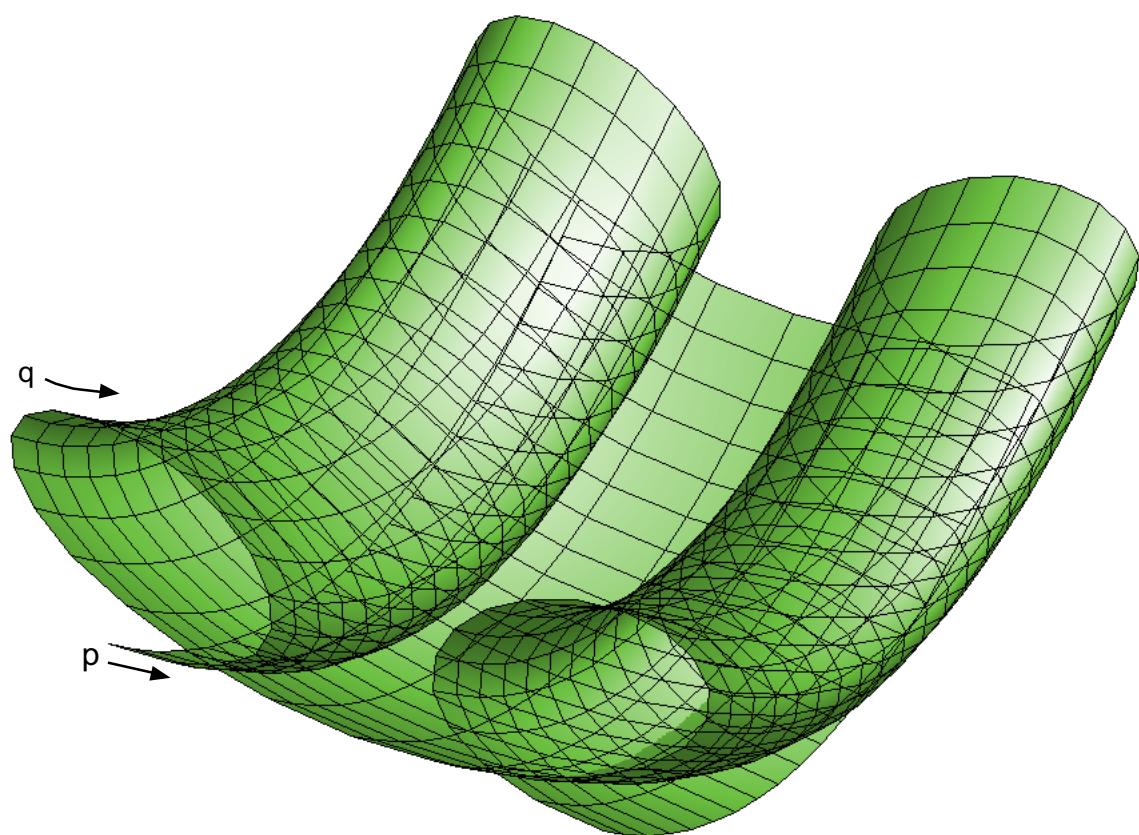
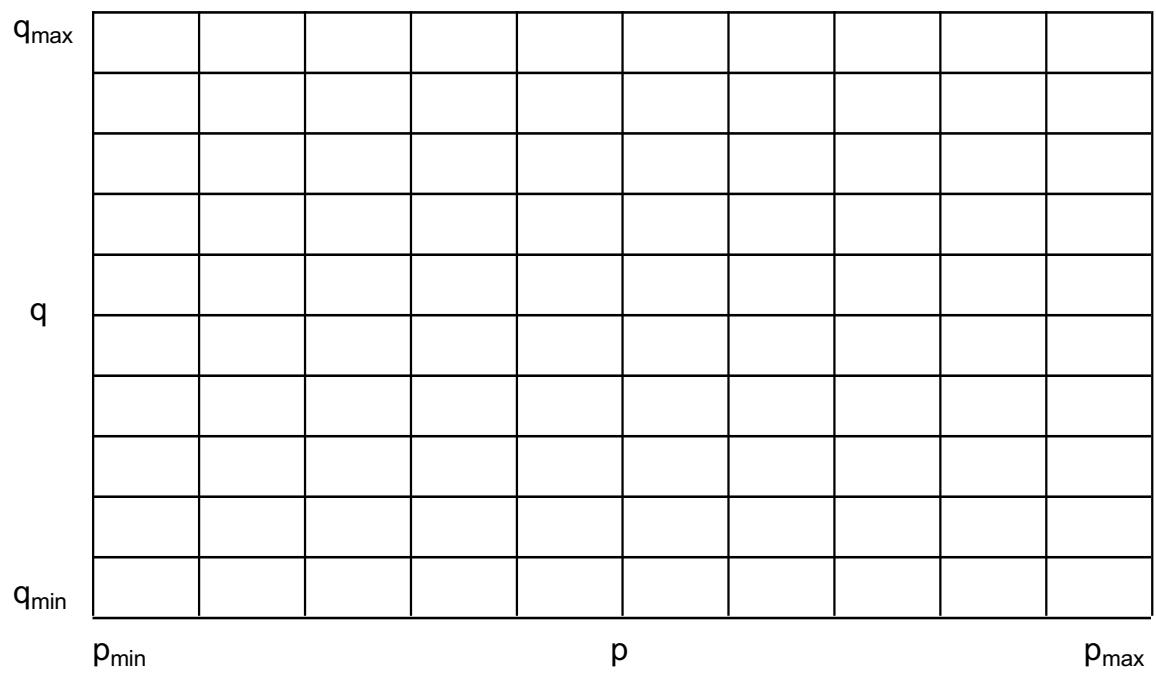


Fig. 8.1 Mapping the parameter plane to the surface

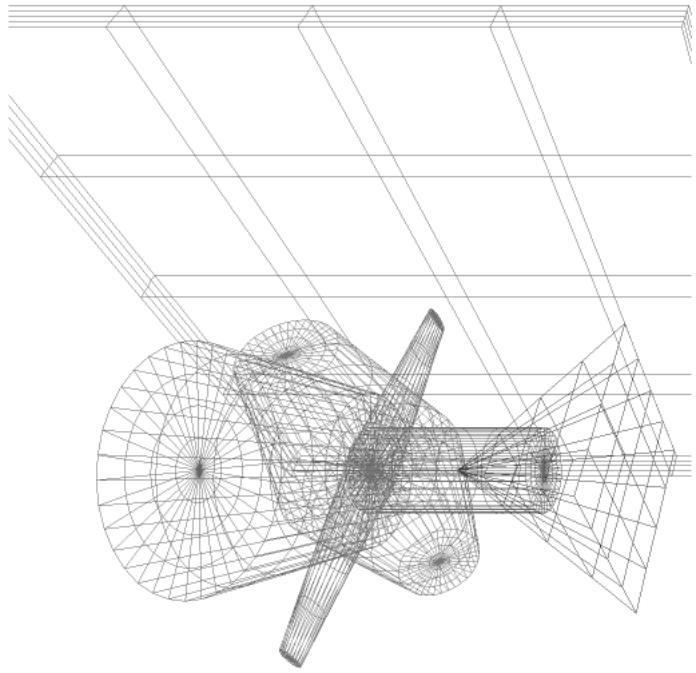
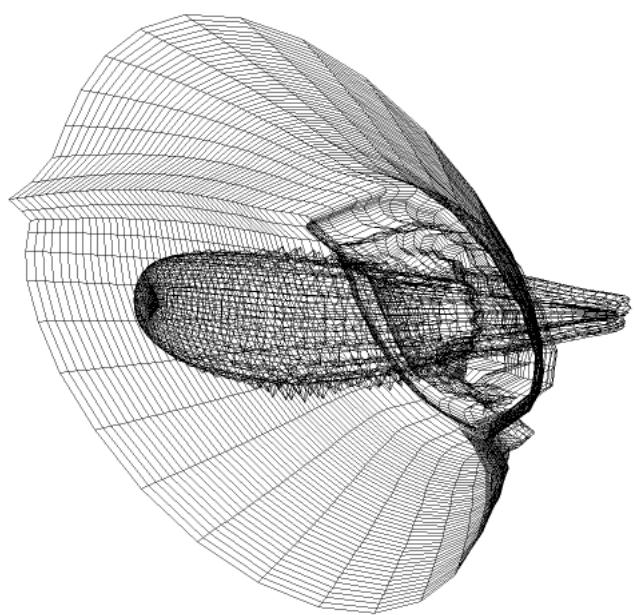
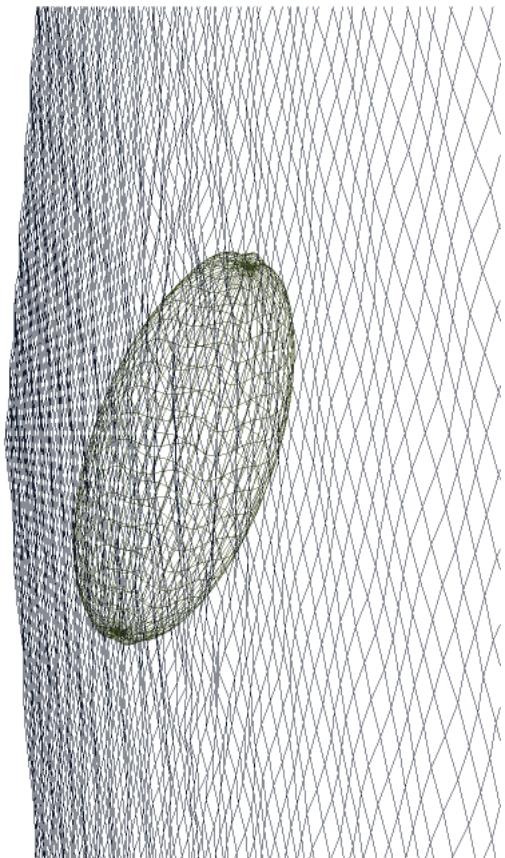
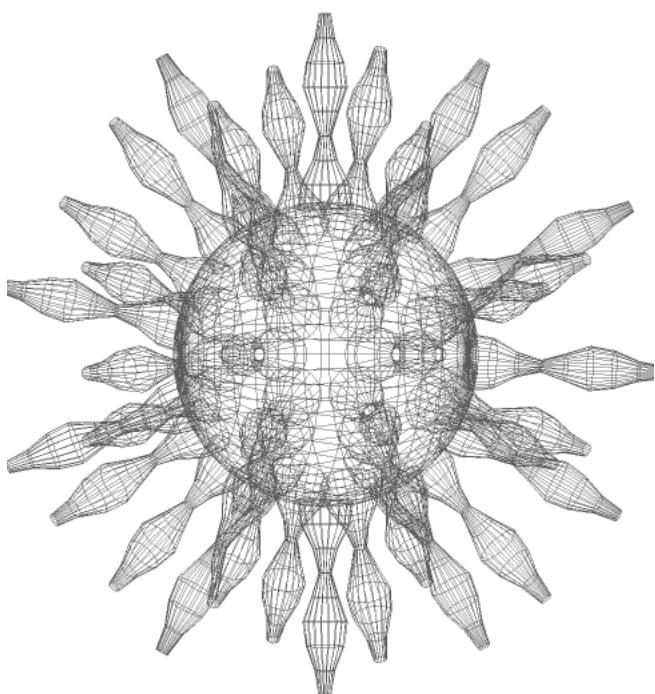


Fig. 8.2 Wireframes for objects

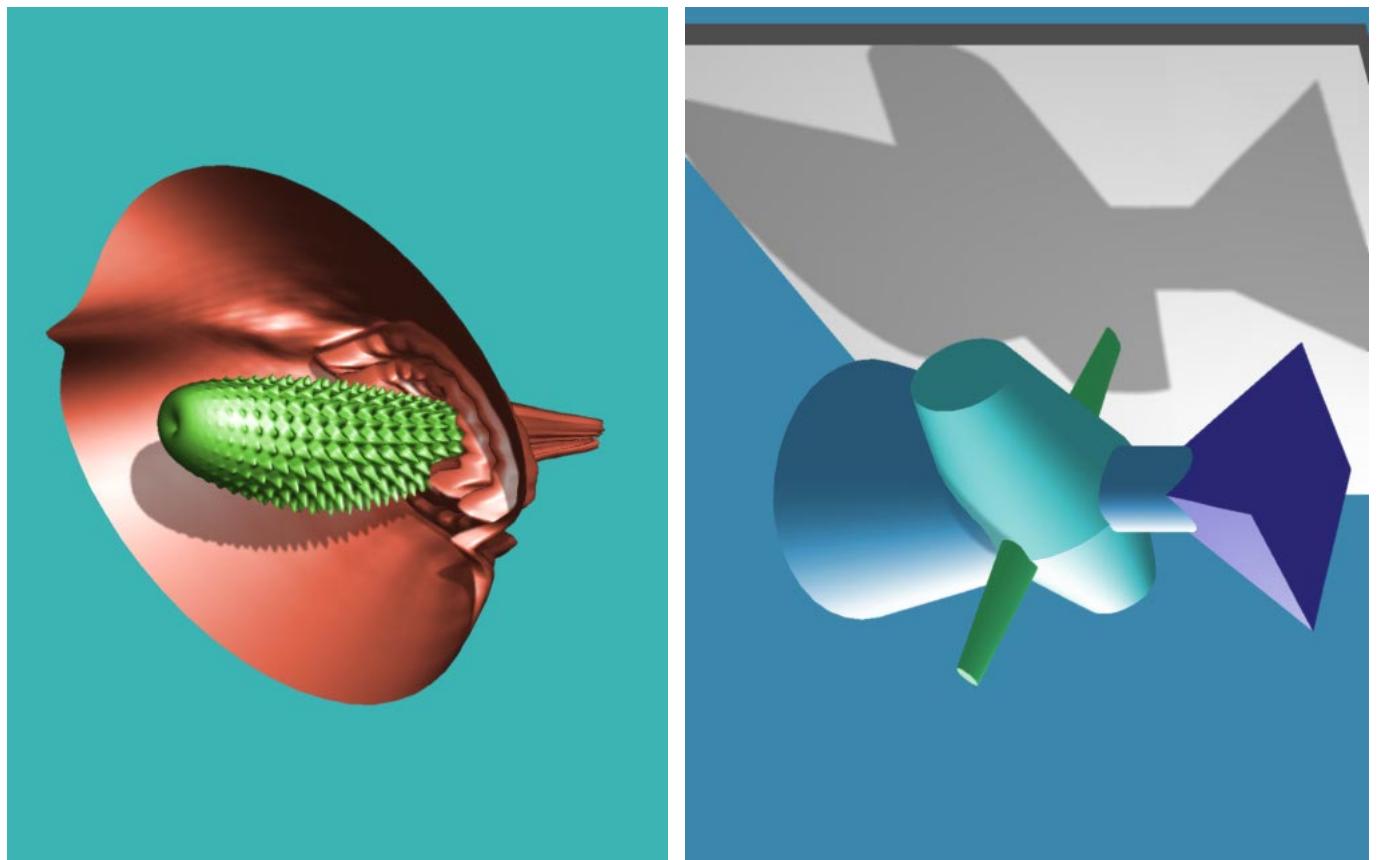
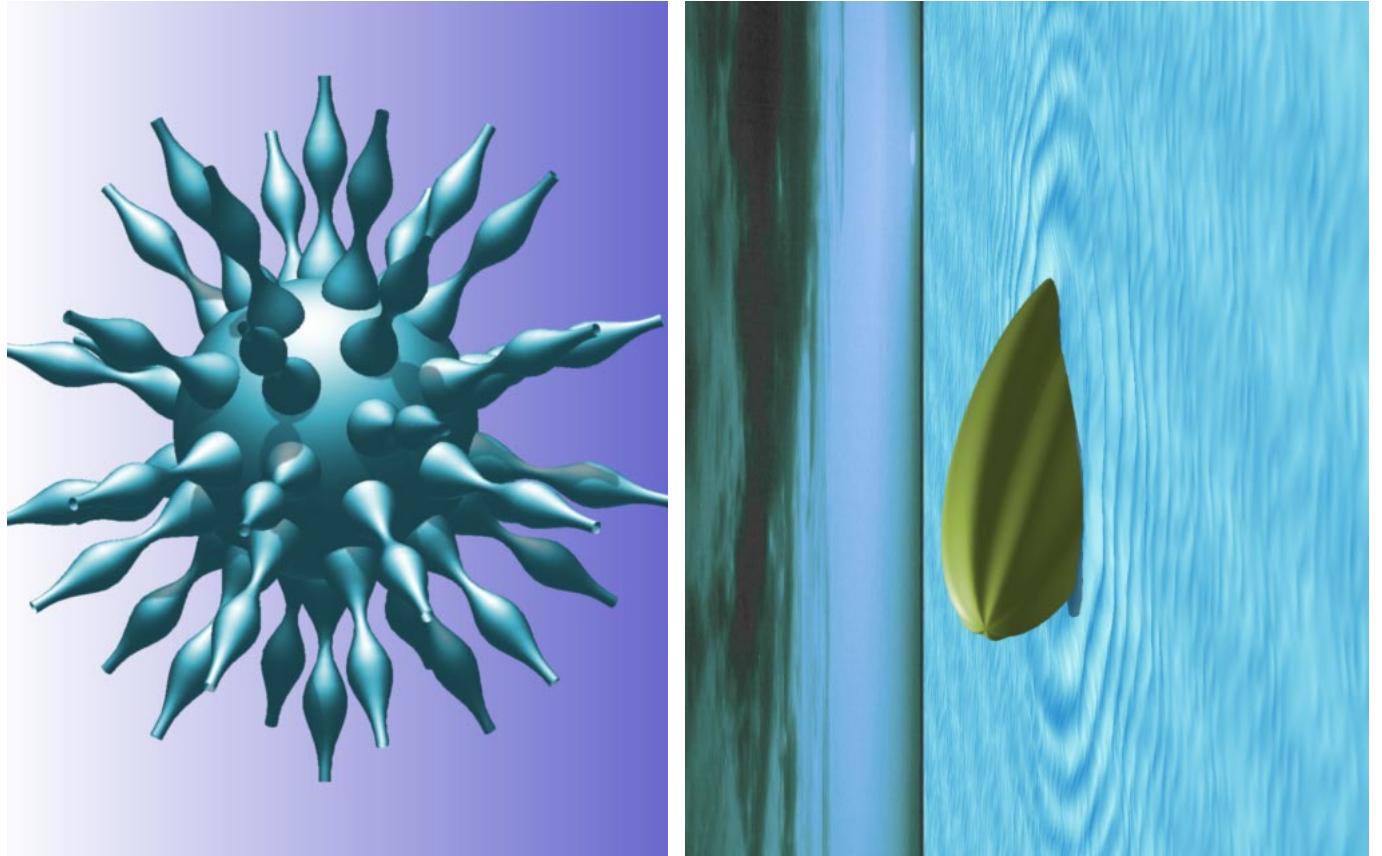


Fig. 8.3 Rendered objects

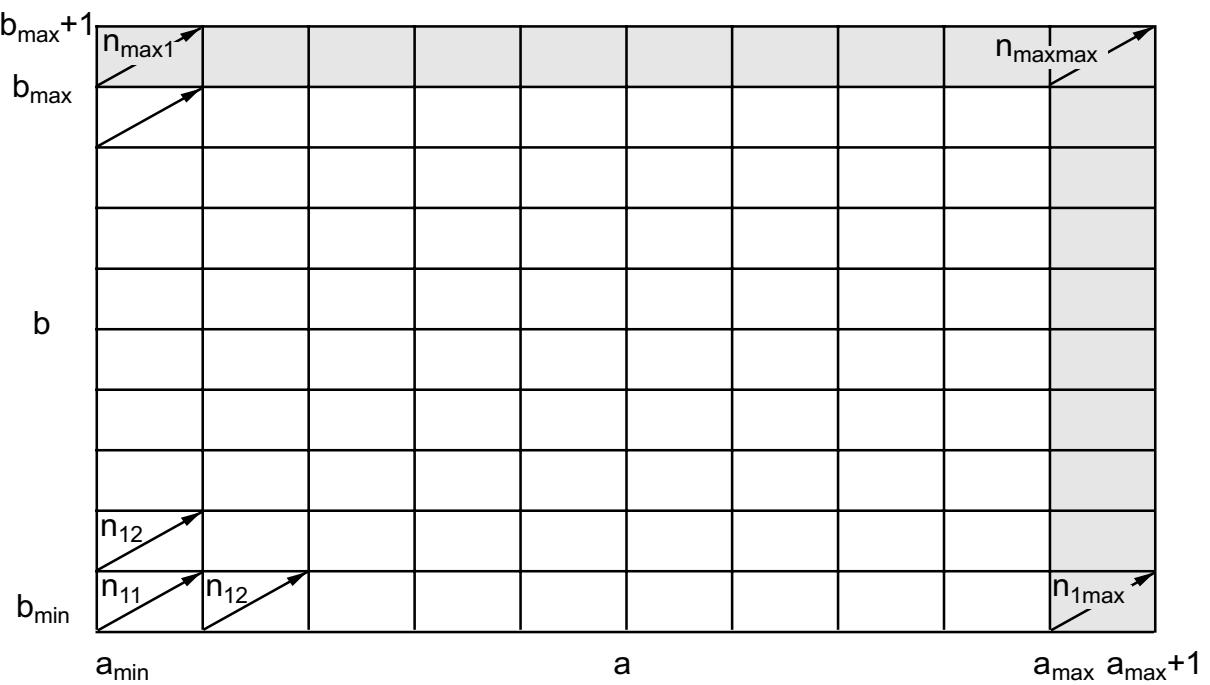


Fig. 8.4 Geometry file and references for normal vectors

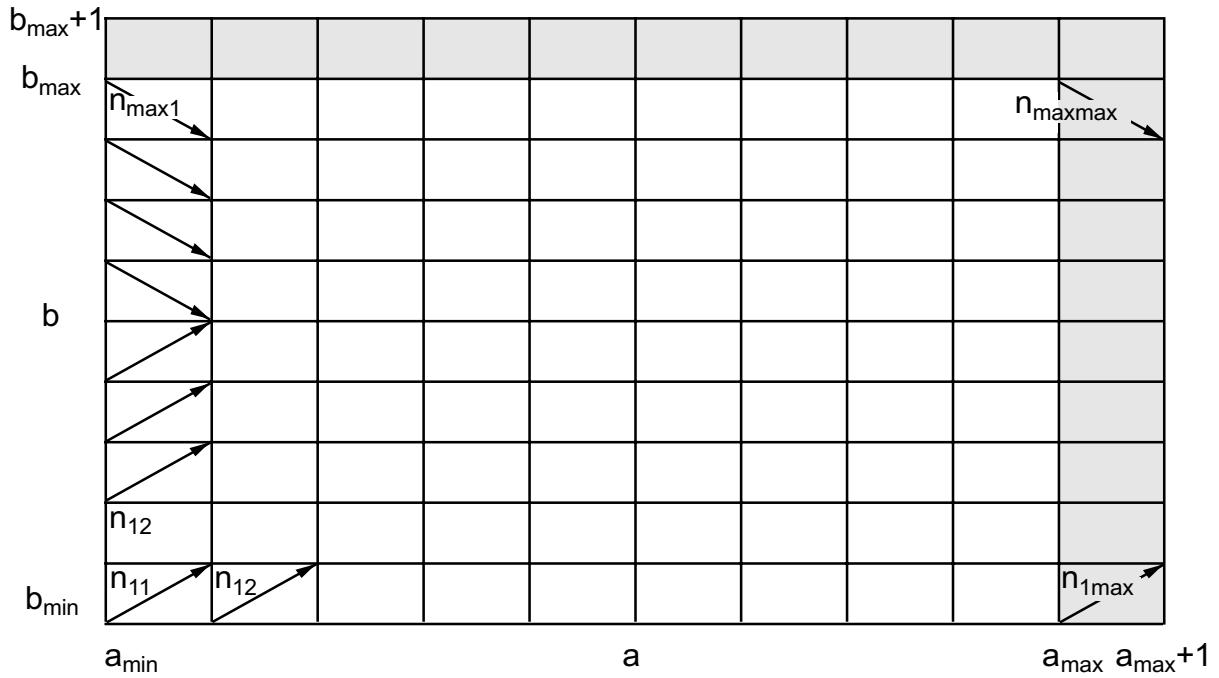


Fig. 8.5 Improved geometry file, especially for sphere coordinates

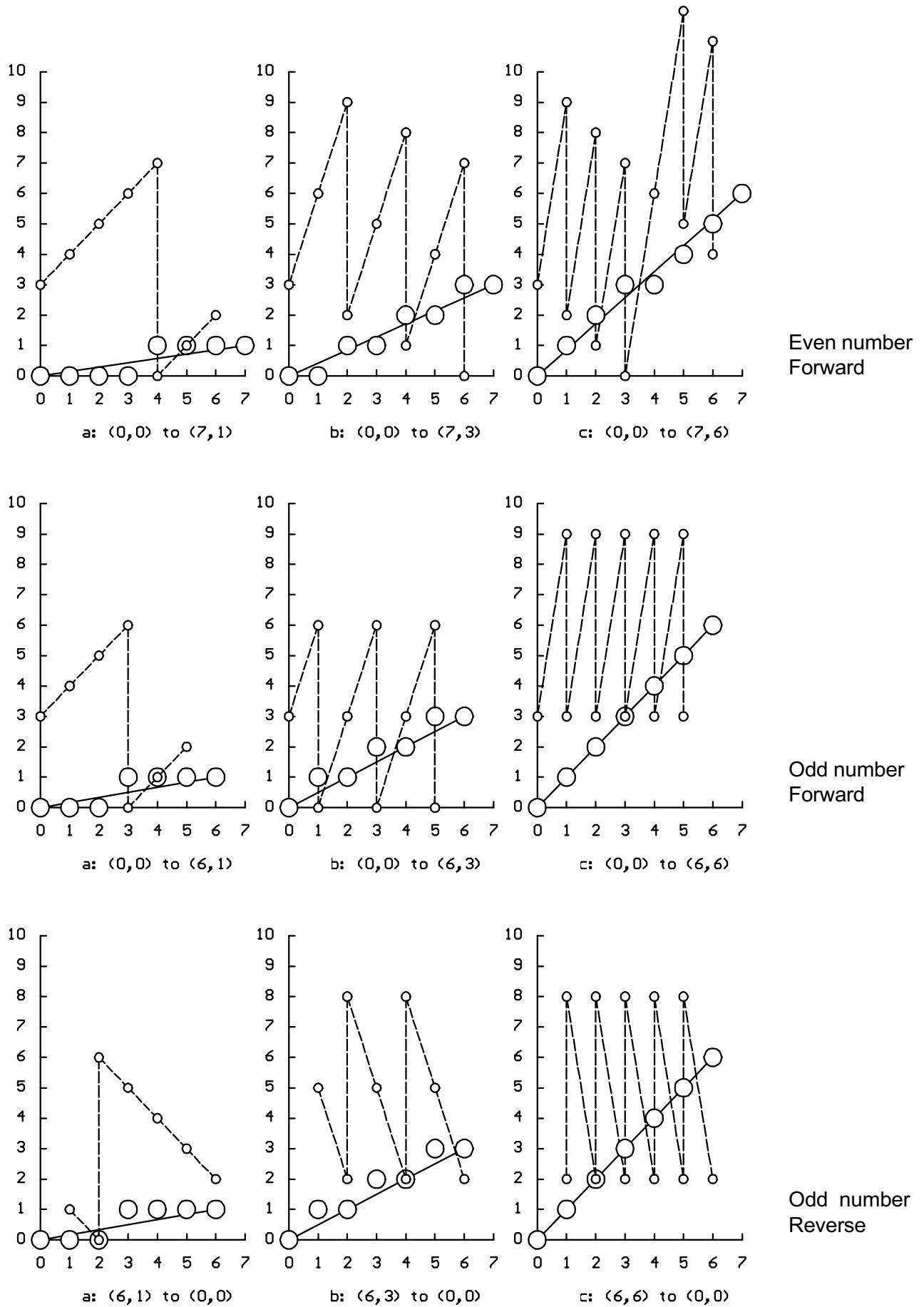


Fig. 8.6 to 8.8 Accurate line drawing by pixels

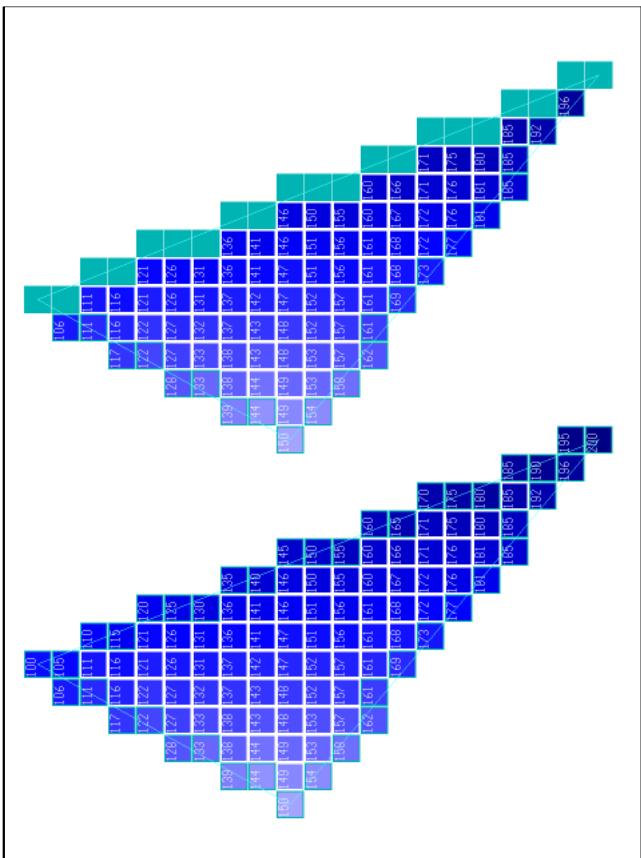


Fig. 8.9 General triangles

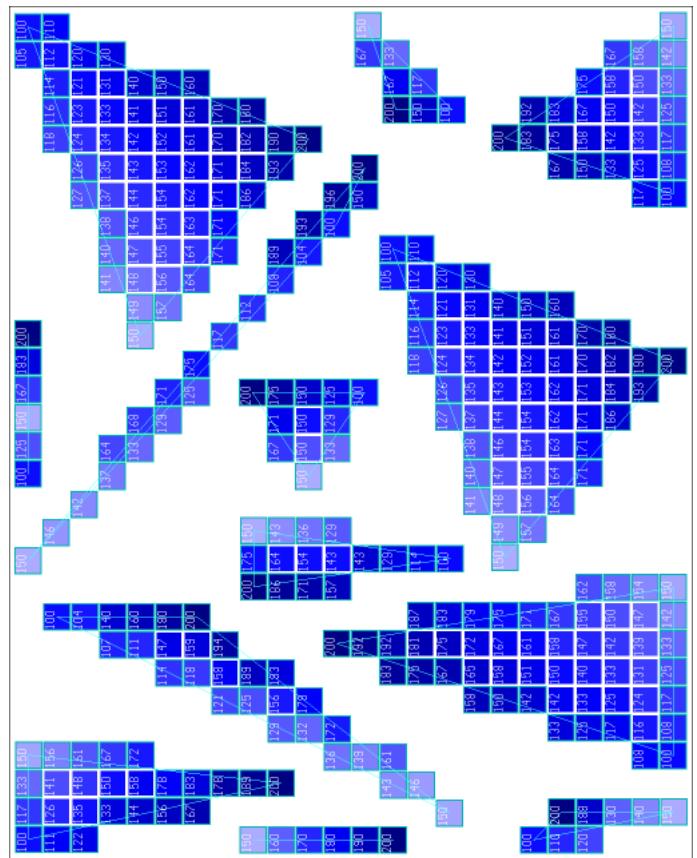


Fig. 8.10 Isolated triangles

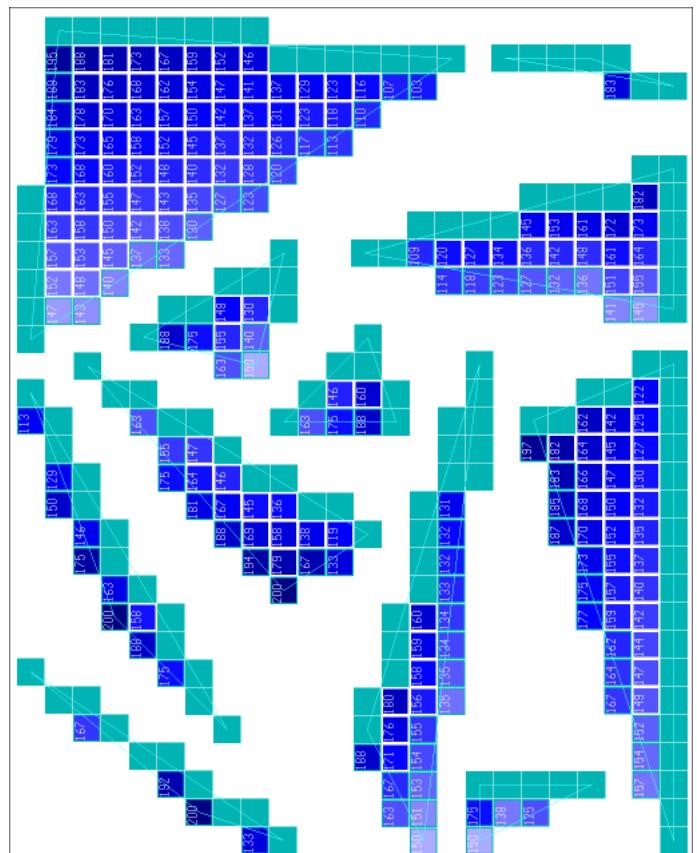


Fig. 8.11 Consistent net triangles

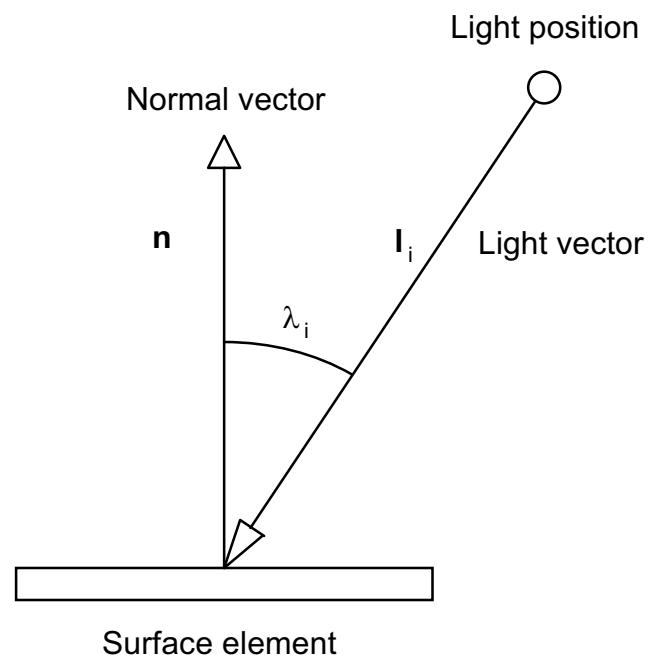


Fig. 9.1 Lambert's law

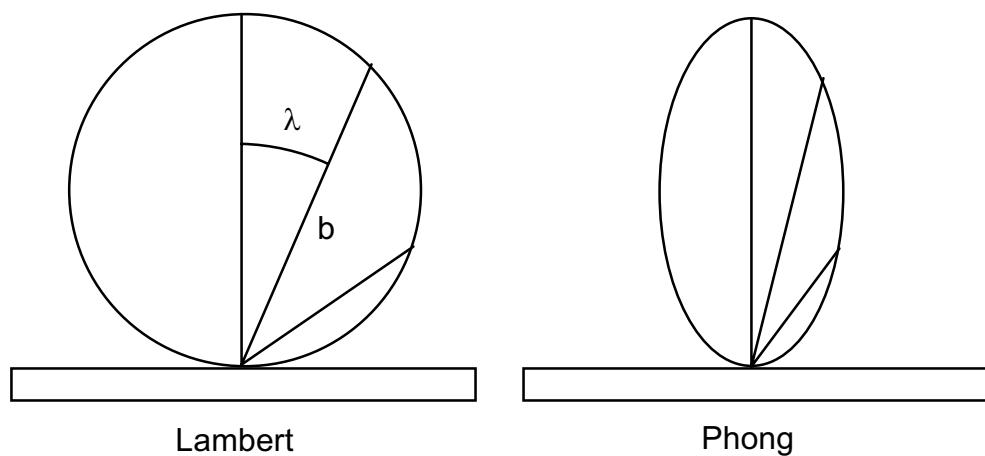


Fig. 9.2 Reflection characteristics

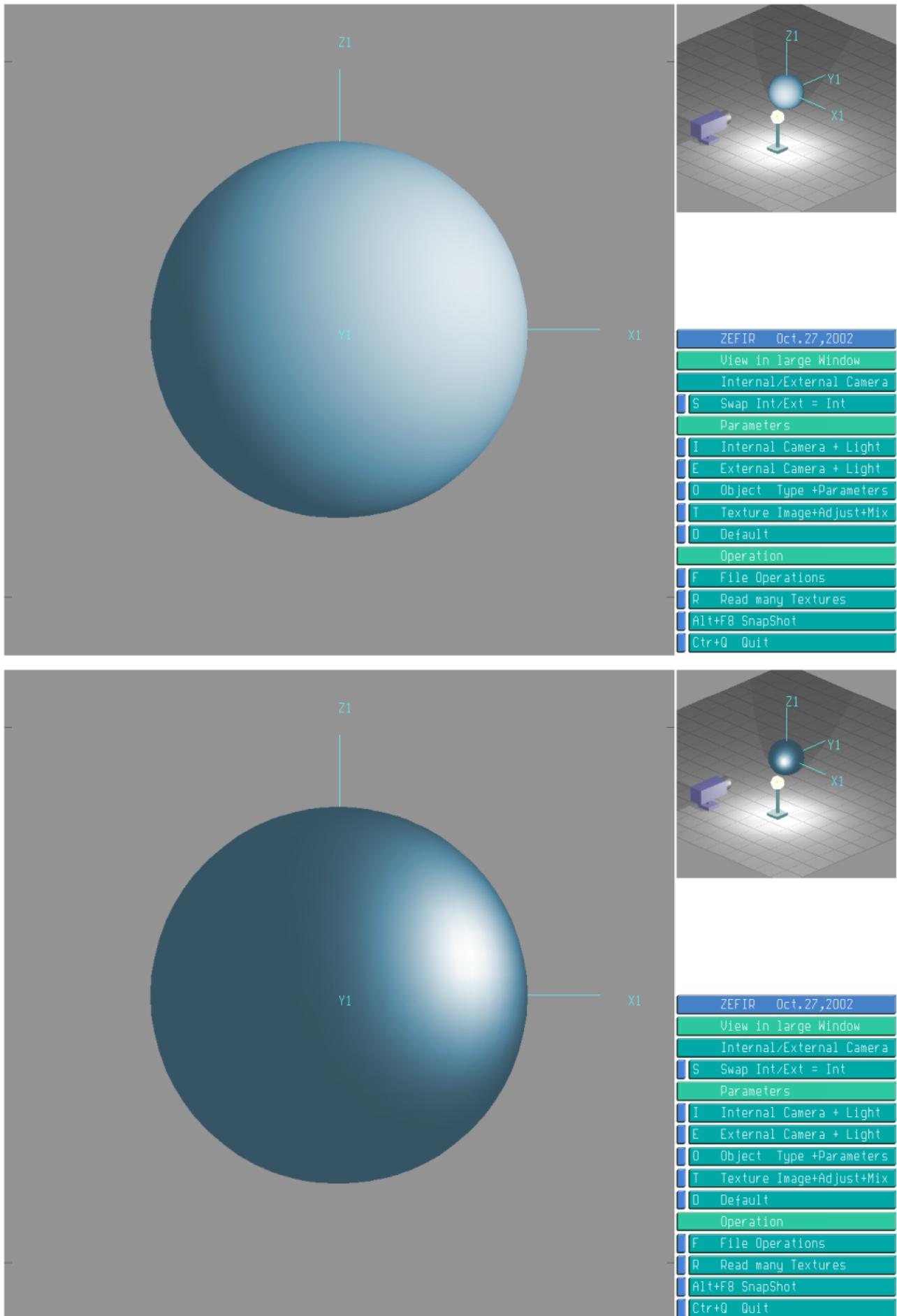


Fig. 9.3 Lambert and Phong

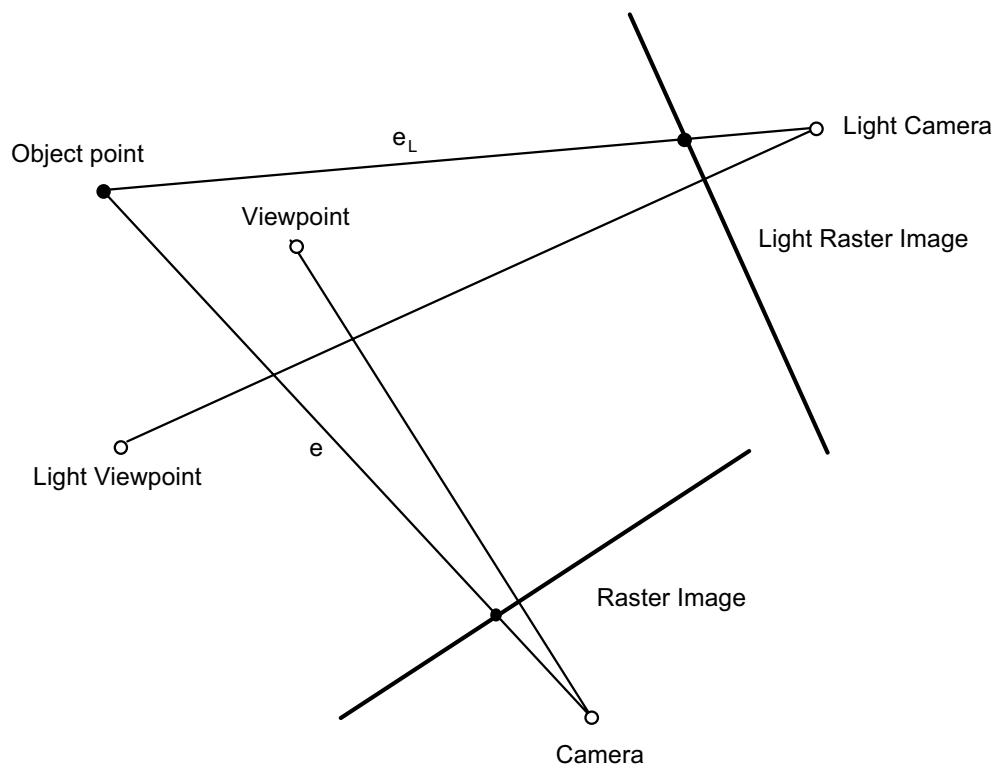


Fig. 9.4 Shadow computation

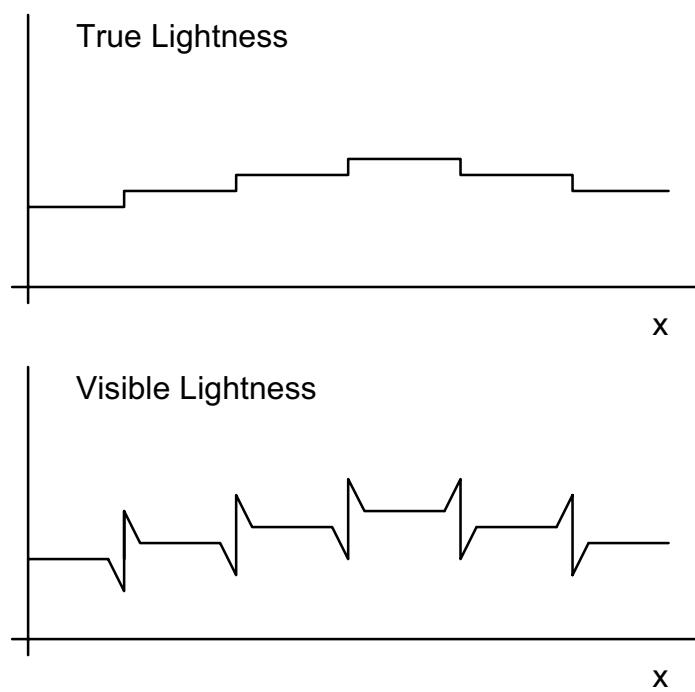


Fig. 9.5 Mach band effect

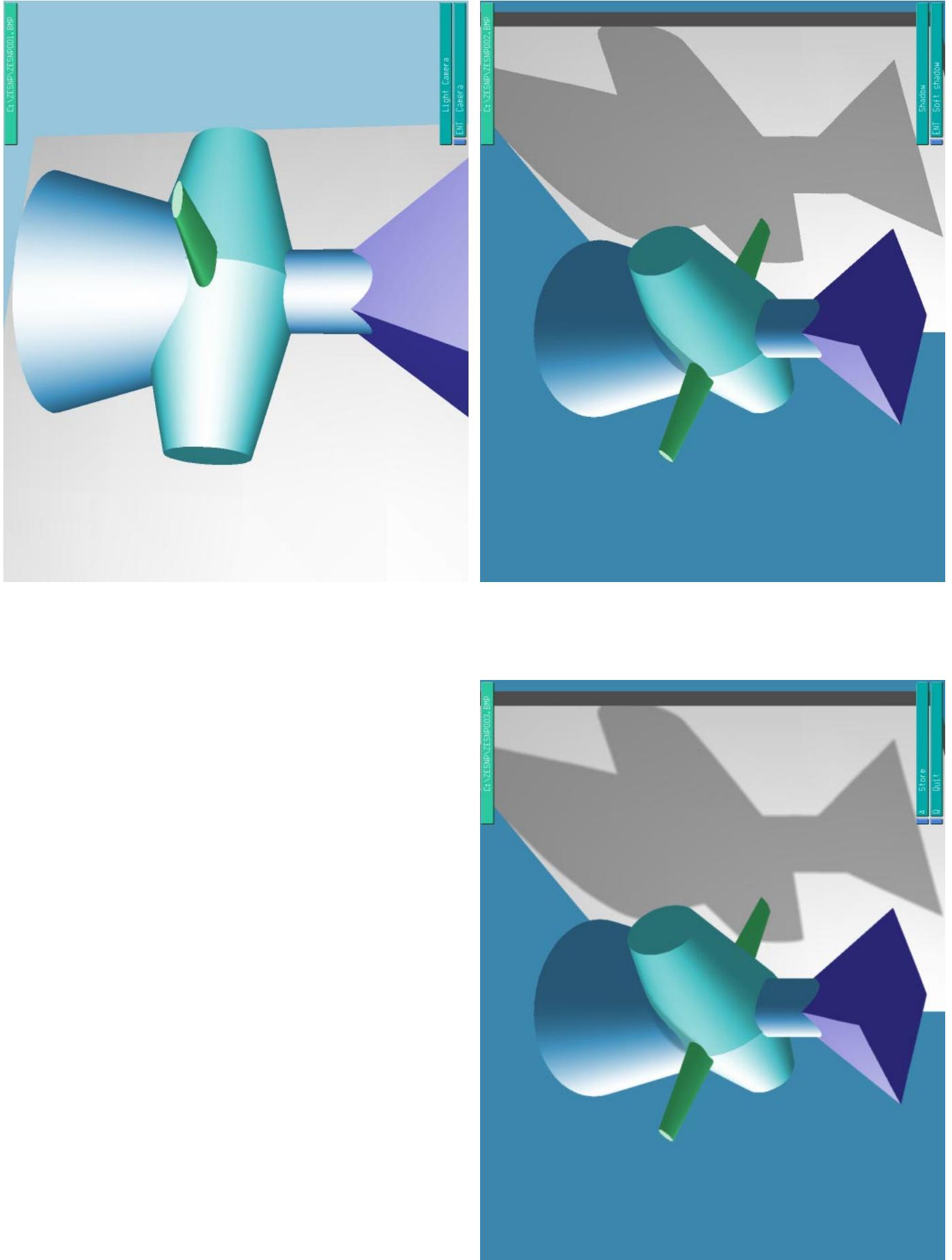


Fig. 9.6 Shadow computation (light camera, sharp and soft shadow)

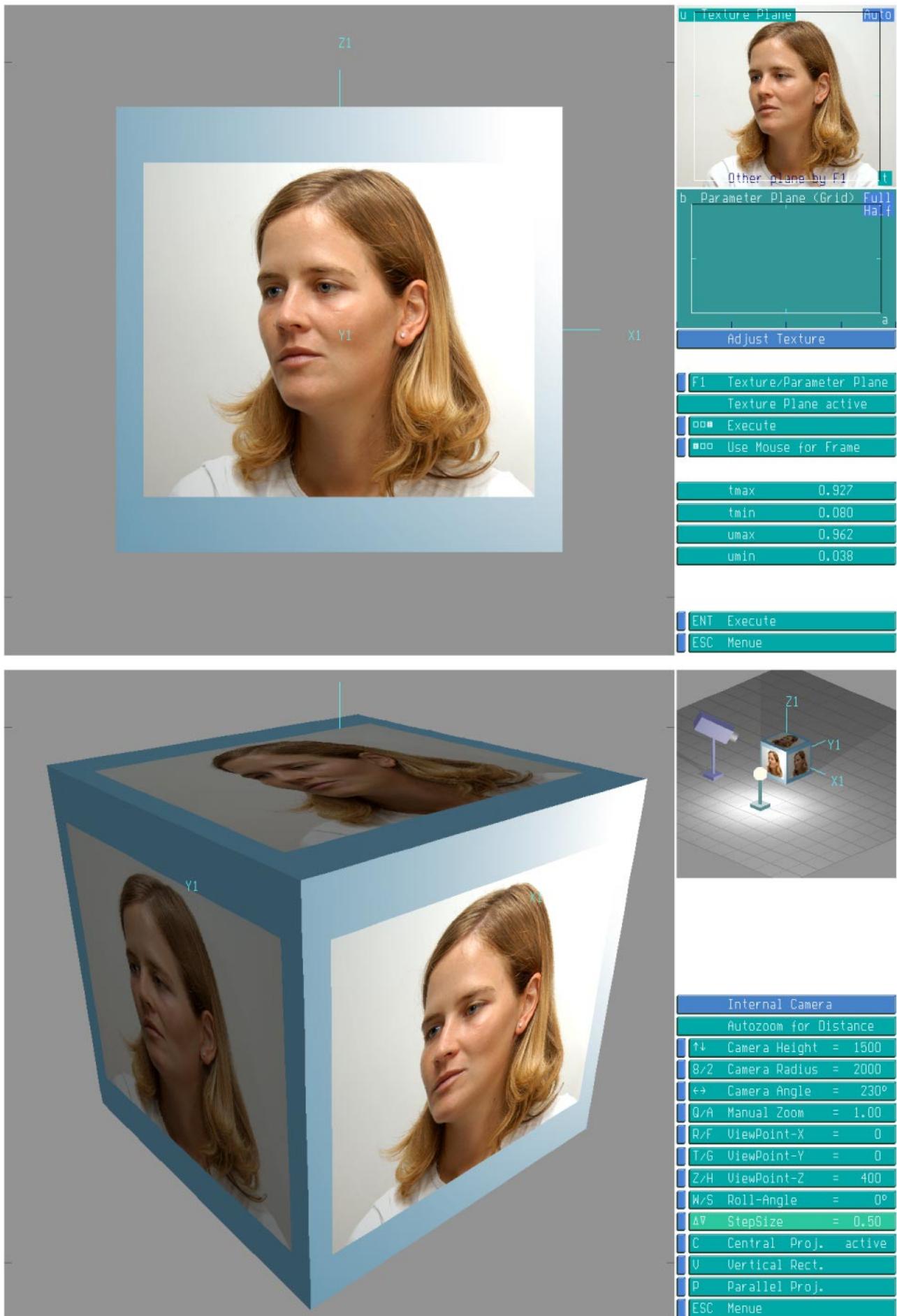


Fig. 9.7 Texture mapping



Fig. 10.1 Multibody scene
Old image, using flat shading instead of Gouraud shading

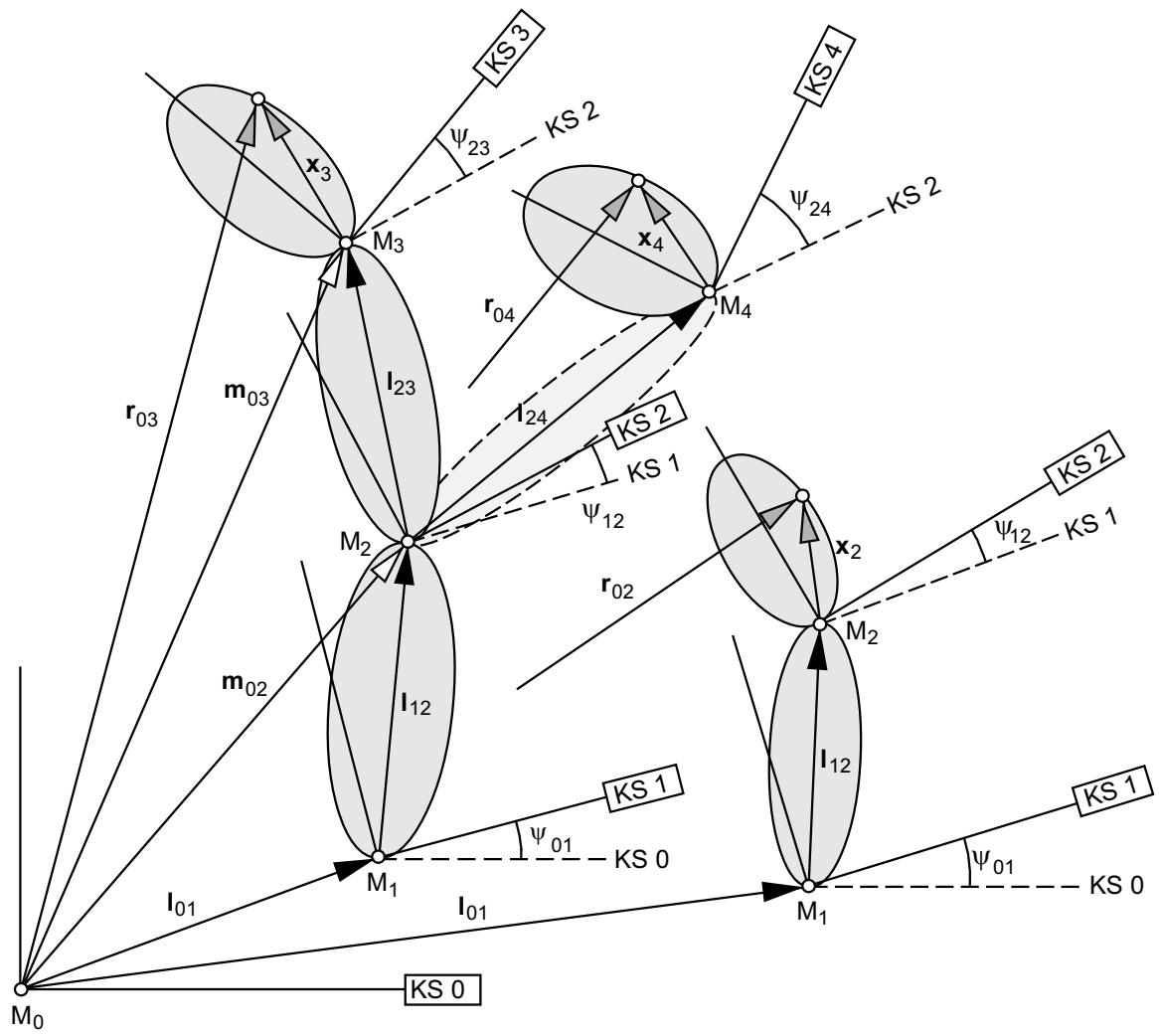


Fig. 10.2 Topology of multibody scene

Old links:

<http://www.fho-emden.de/~hoffmann/>

<http://www.fho-emden.de/~hoffmann/filename.pdf>

Please use since February 2013

New links:

<http://docs-hoffmann.de/>

<http://docs-hoffmann.de/filename.pdf>