

9.4 Object-space polygon-clipping approach

9.4.1 Nishita-Nakamae algorithm

Nishita and Nakamae (1974) describe a method for shadow generation based on a convex polyhedron-clipping algorithm. Hidden-surface removal from any chosen point of view is accomplished by determining the silhouette contours of each polyhedron and using them to define its clipping border. Objects which lie behind a selected polyhedron are clipped to the window defined by the polyhedron's outer boundaries.

Shadowed images are generated by this clipping method in two steps:

1. A view is taken in the direction of the infinite light source. Using the polyhedron clipper, all the hidden surfaces, which are surfaces in the shadow, are found
2. The scene is transformed to a selected viewpoint, and all hidden surfaces are removed by a method similar to the Bouknight-Kelley algorithm

Figure 9.6 shows the principle.

Nishita et al. (1985) propose an extension of the method to treat point sources with luminous intensity distribution, as explained in Sect. 7.1.4. The algorithm detects shadow boundaries on a perspective plane observed from the light source. For simplicity of shadow detection, a partial sphere of lighting is used. This partial sphere bounds a space where the illuminance cannot be neglected.

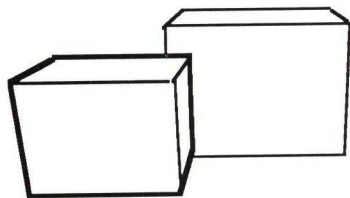
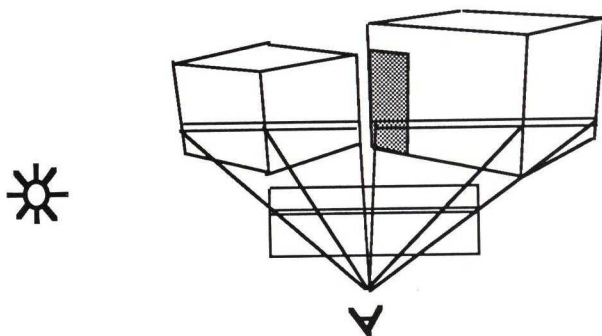
**a****b**

Fig.9.6 a,b. Principle of the Nishita-Nakamae algorithm