

object has  $\alpha=0$ . The final steps required for translucency are the addition of the blending function attribute and the enable operation. Select Gizmo→Enable Transparency Blend menu to create the blending function and the enable operation and add both to the display list.

The isosurface is a special case because by construction it consists of non-intersecting triangles. In most applications it is sufficient to sort the triangles in the order of the distance of the viewing point from the centroid of the triangle. You can obtain the triangles corresponding to an isosurface object using **Modify-Gizmo** with the `saveToWave` keyword and establish a sample viewing point. The standard orthographic projection implies infinite distance to viewing point. An example of this type of sorting can be found in the Depth Sorting demo experiment.

## Gizmo Lights

Gizmo supports both directional and positional light sources. The type and color of the lights that you add to the display affect the appearance of objects in the display window.

You create lights like any other object by selecting Light from the object list pop-up menu. Using the Light Properties dialog, shown below, you can specify the light type and various light parameters. For the light to have any effect, you must add it to the display list above any object that you want to illuminate.

Lighting effects are defined in terms of their ambient, diffuse, and specular components. The distribution of light intensity is described by the location of the light source, direction, cone angle, and attenuation. The final appearance of an object depends on the combination of the properties of the light and the properties of the object material.

Lighting effects are computed in hardware on a per pixel basis. Therefore, when you want smooth shading, you must describe the object using a sufficiently large number of vertices. For simple objects, such as a single quad (4 vertices), you will likely not see much variation in lighting across the quad. Shading is computed using the dot product between the normal to the surface at each vertex and the direction of the light source. There is no accounting for objects obscuring other objects from the light source or for multiple reflections of light.

If you add no lights to the display list, Gizmo uses default, color-neutral ambient light. If you add a light to the display list, Gizmo removes the default lighting.

### Gizmo Directional Lights

You can think of a directional light as a light positioned very far away from the scene so that its rays are essentially parallel within the display volume. The sun is a good example of a directional light. New light objects are directional by default.

The Light Properties dialog contains the controls you need to specify the light's position, color properties and distribution. When editing a light object that is already in the display list, you can click the Live Update checkbox to see how your changes affect the Gizmo Display.