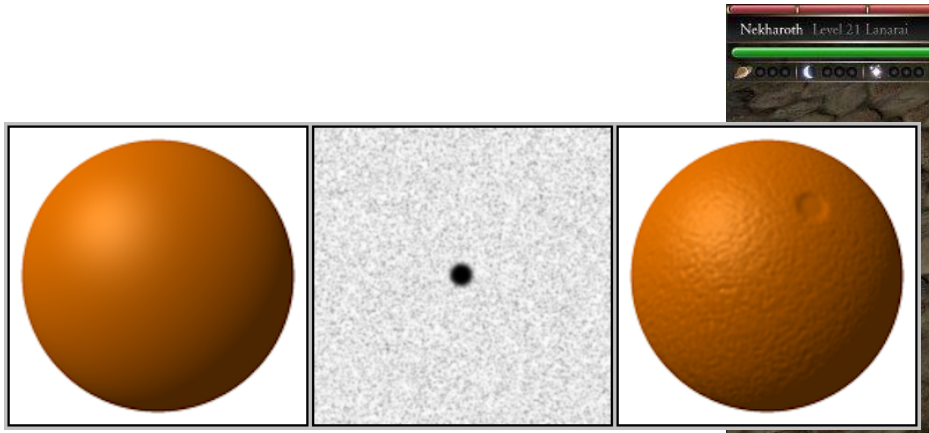
Bump mapping

Background

- Used for simulating bumps and wrinkles on the surface of an object
  - Technique was created by Jim Blinn in 1978



Bump mapping Vs. Displacement

- Bump mapping: the underlying object is not changed
  - Instead, the surface normals are perturbed during lighting calculations
- Displacement mapping: actual geometric position of points over textured surface are displaced

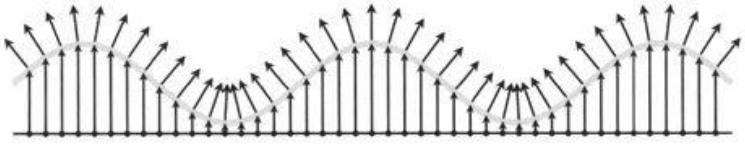
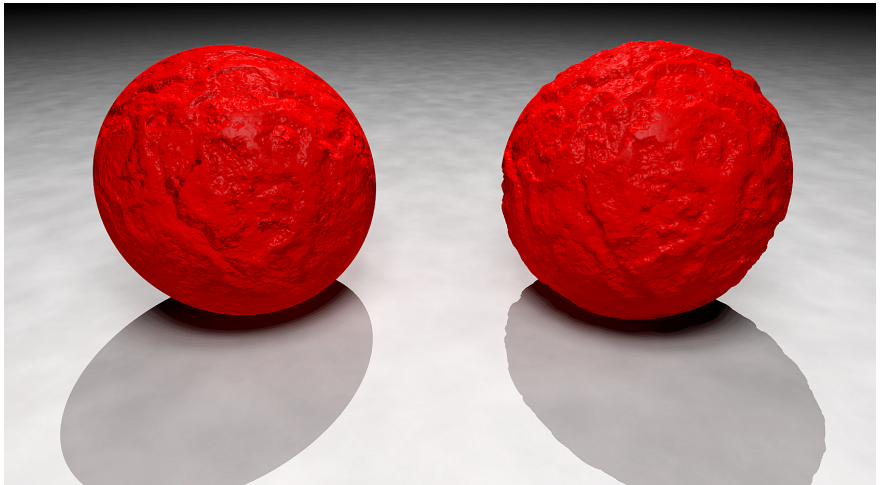


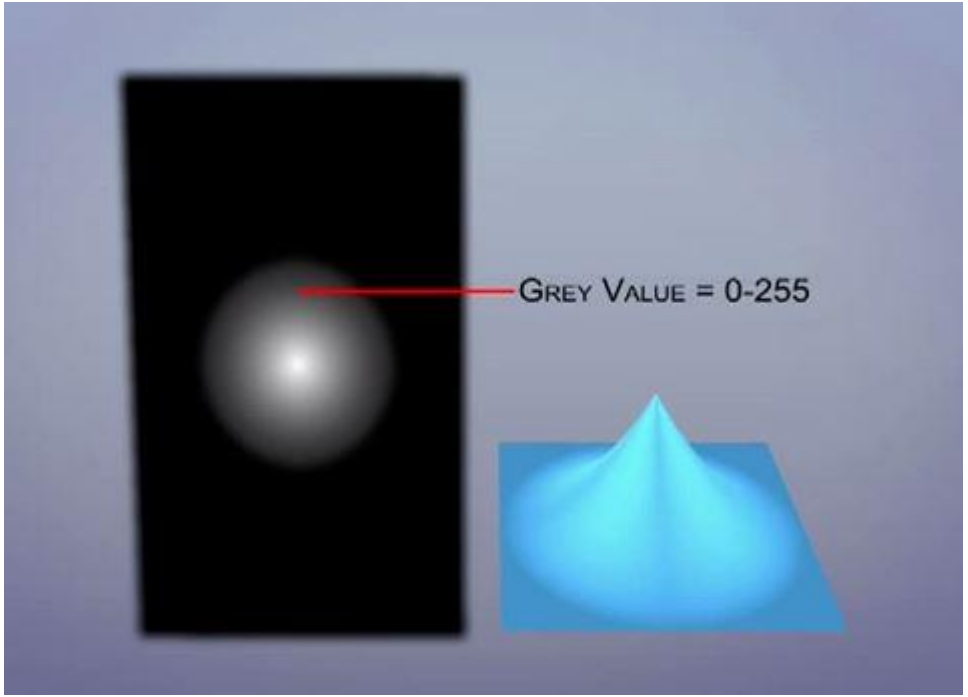
Figure 18.1: Associating points on a surface with a surface geometry to be simulated

You can create the appearance of this simulated surface by modifying, or *perturbing*, the normal vectors of a flat surface to the orientation of the simulated surface, even though the actual surface is not in fact oriented in those directions.

Figure 18.2: Changing the normals of a flat surface to simulate geometric complexity



Mapping



Bump mapping Vs. Displacement

A

Displacement Map

Fig 1

Fig 2 - Geometry altered

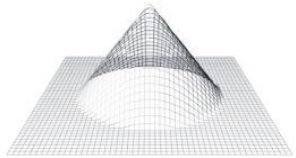


Fig 3 - Geometry altered

B

Displacement Map

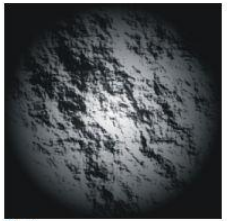


Fig 4

Fig 5 - Geometry altered

Fig 6 - Geometry altered

C

Bump Map

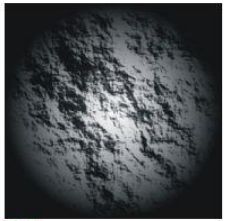


Fig 7

Fig 7 - Geometry intact

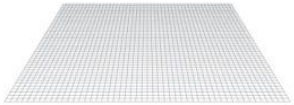


Fig 8 - Geometry intact

Uses of bump and displacement mapping

Some uses of Displacement Mapping:

- landscapes
- animating fields of grass or trees
- waves or ocean water (and animating it)
- animating fire, clouds, smoke, or any other particle-driven volume

Some uses of Bump Mapping:

- adding realism to textures (human skin, orange peel)
- adding small details to an object
- simulating grass from far away

http://youtu.be/sdI7sInBp9w?t=52s