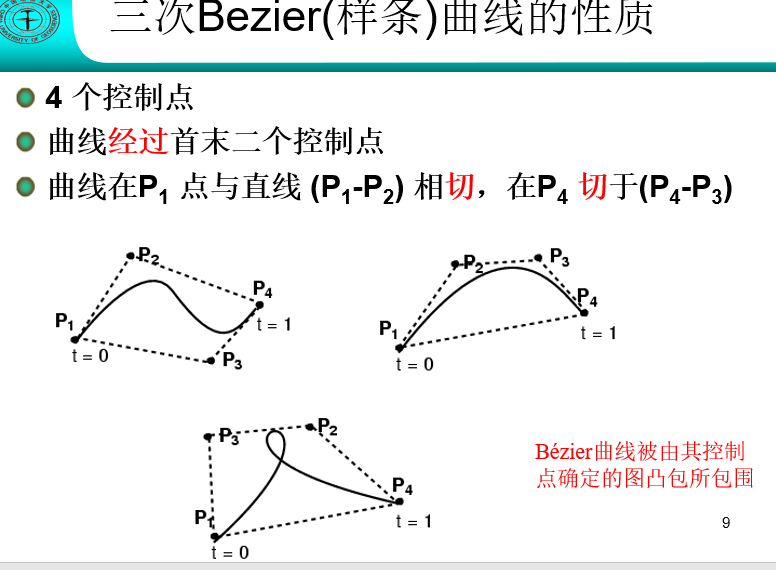
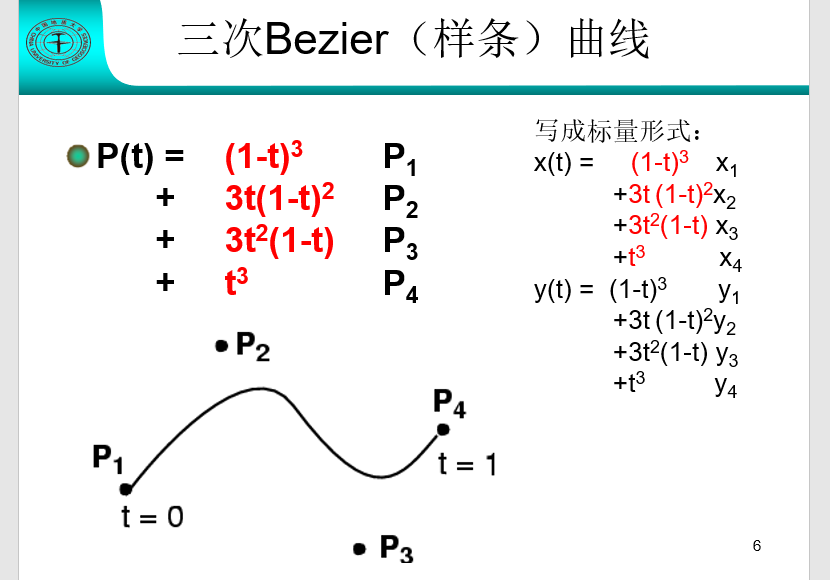
**计图**

# 1.Bezier曲线

（1）给出四个控制点。T在0到1之间，如果平滑就是插n个点t增量为1/n。

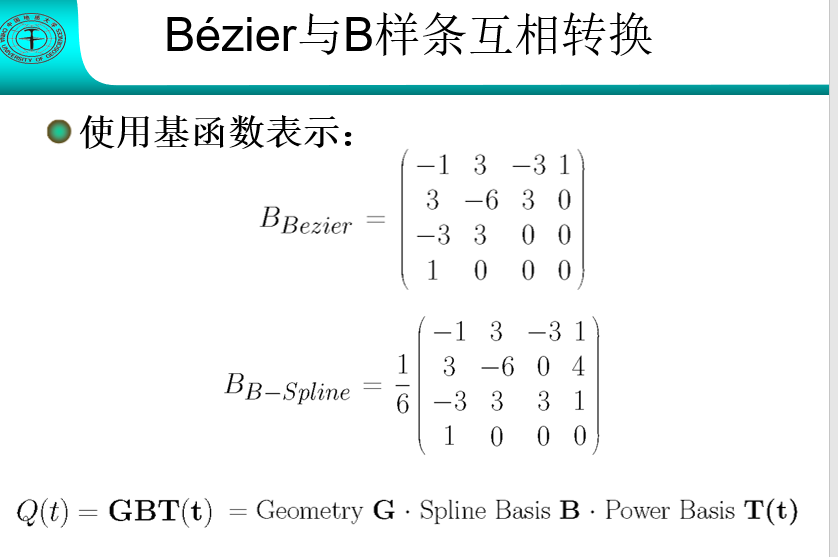
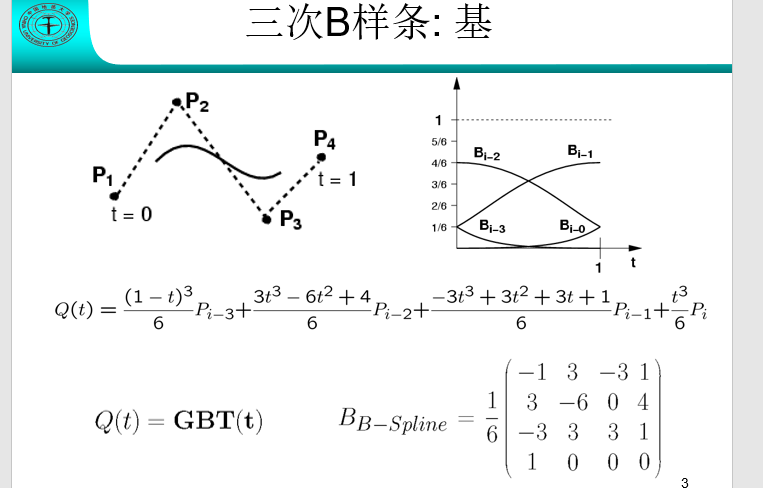


（3）几何法画三次Bezier曲线。t根据比例求出。

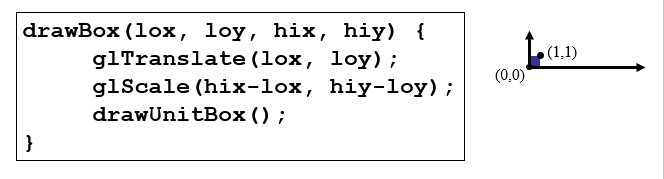


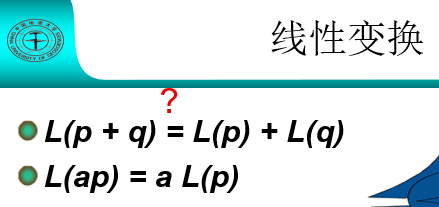
# 2.B样条

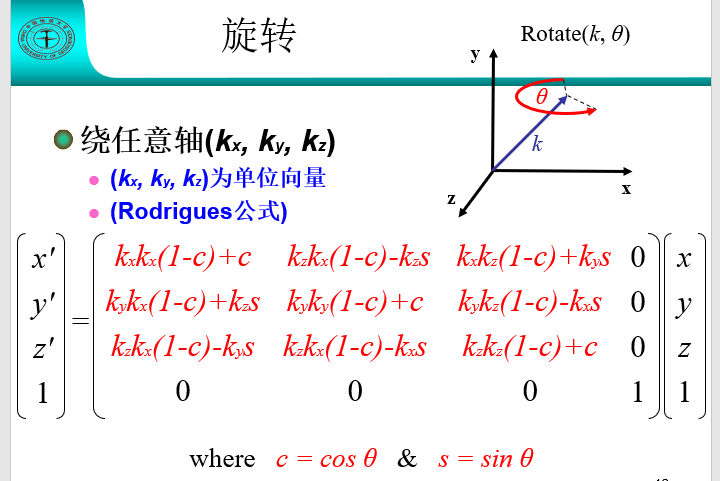
曲线不经过任何控制点，且由控制点闭包所围。



# 3.变换

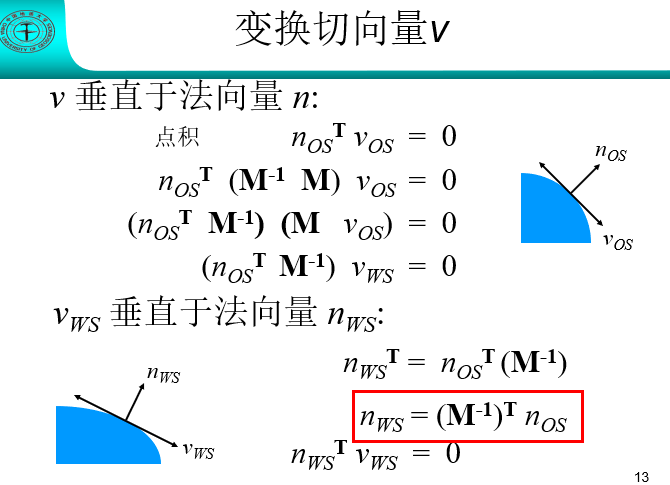
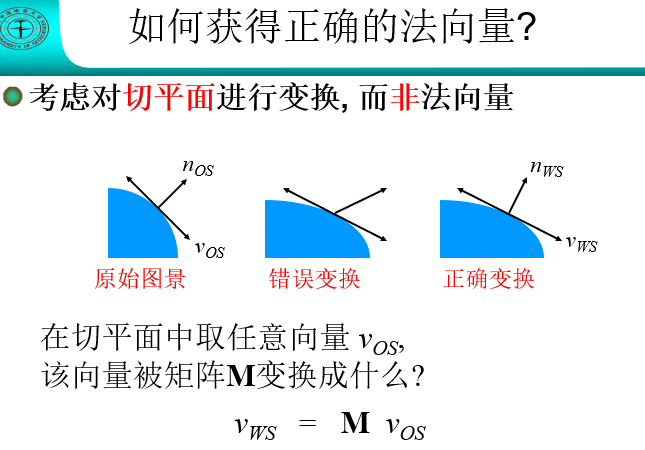






复合变换不可逆

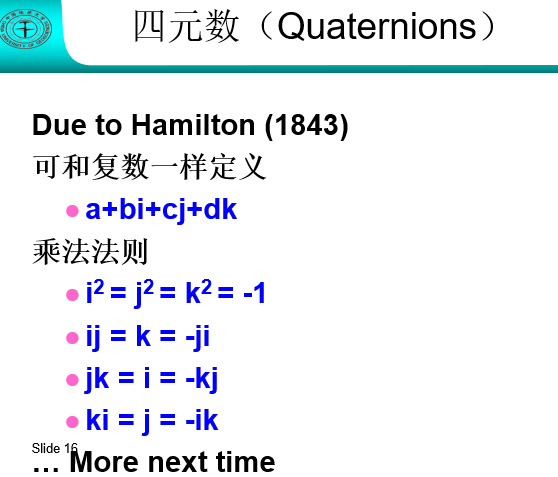
法向量变换



# 4层次建模

矩阵栈

# 5.四元数



# 6.动画系统

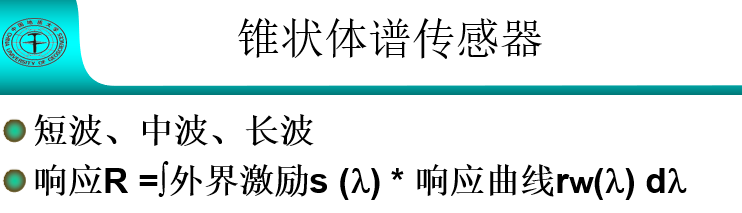
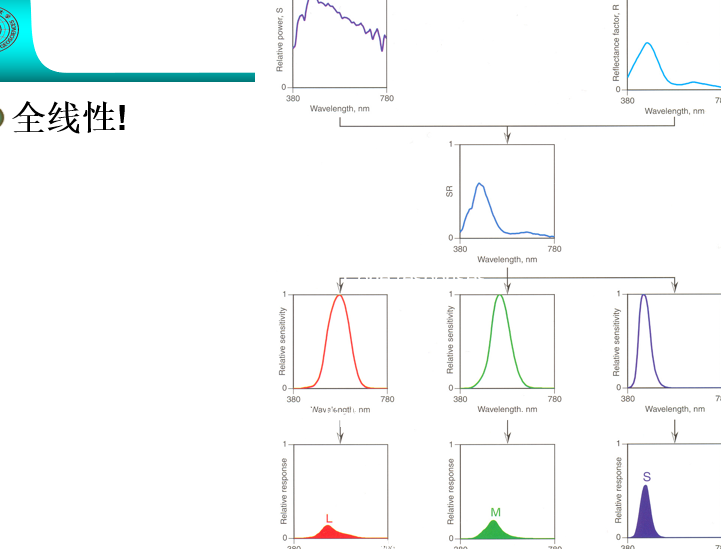
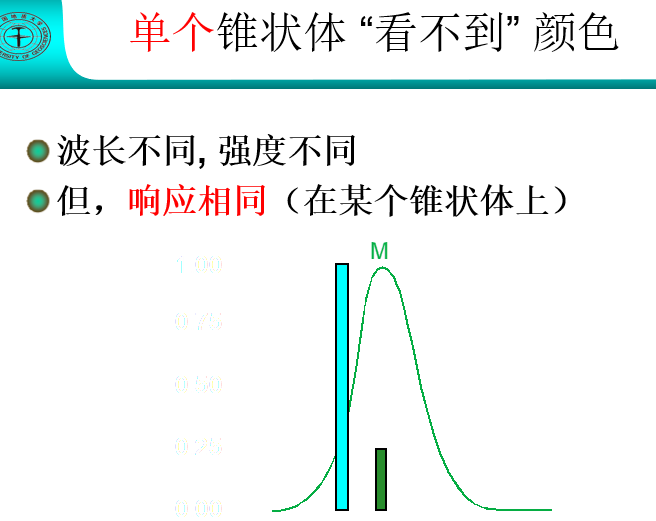
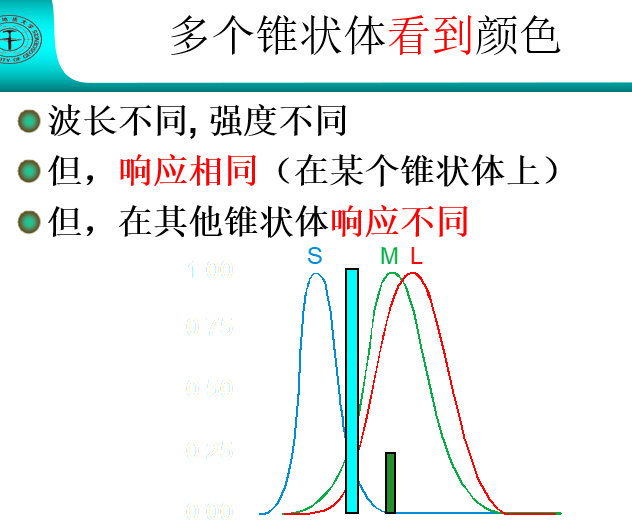
物理动画

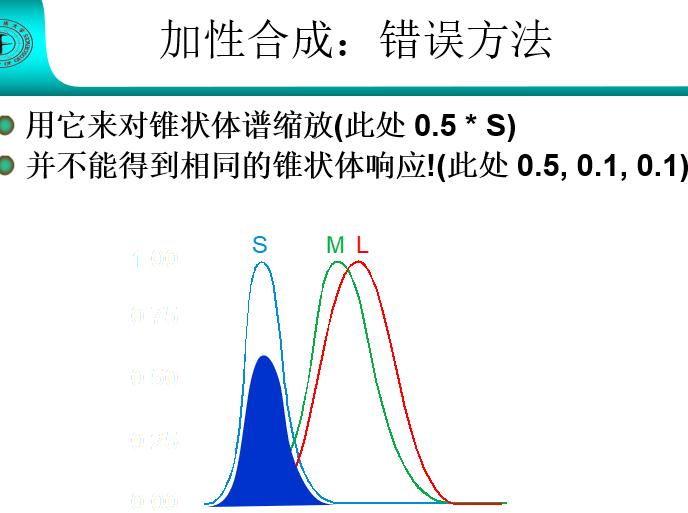
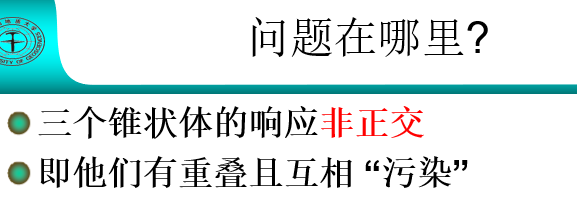
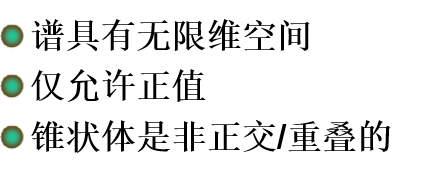
蒙皮：权重和，绑定姿势。

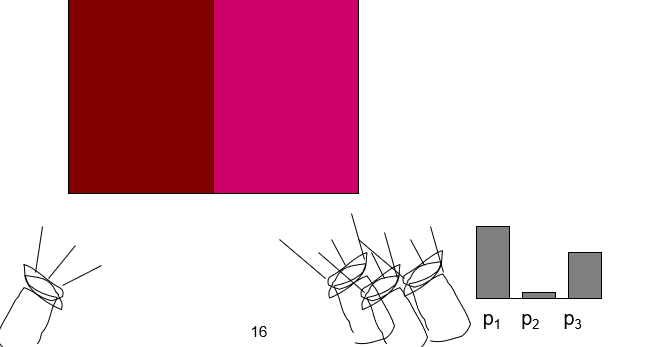
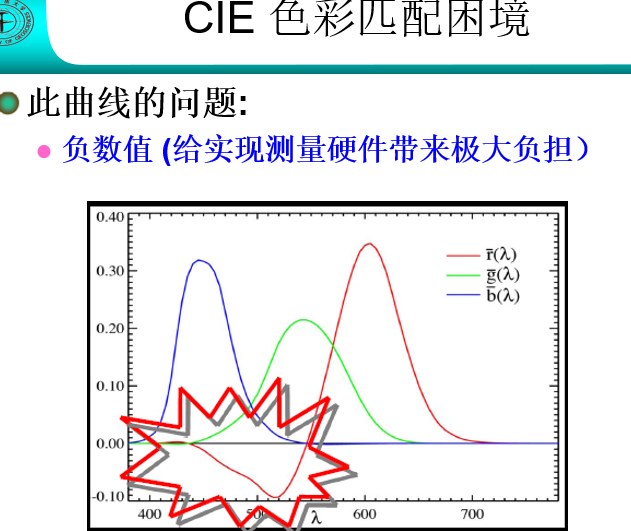
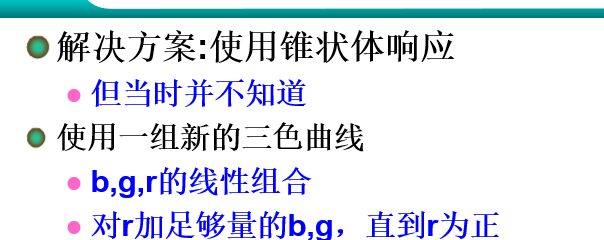
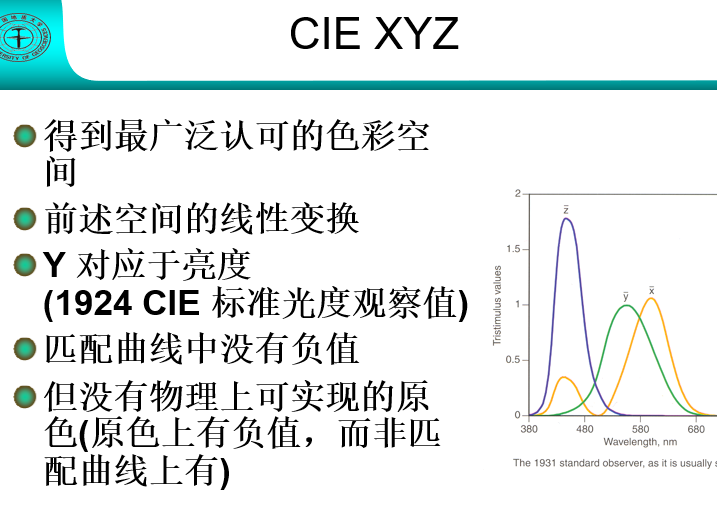
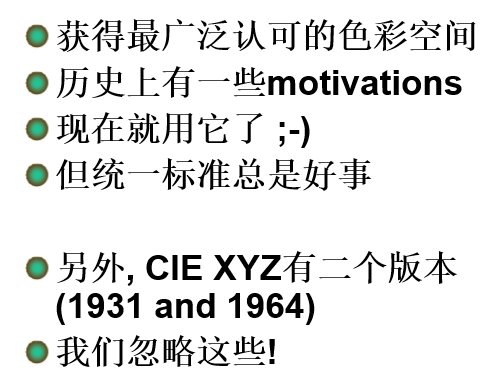
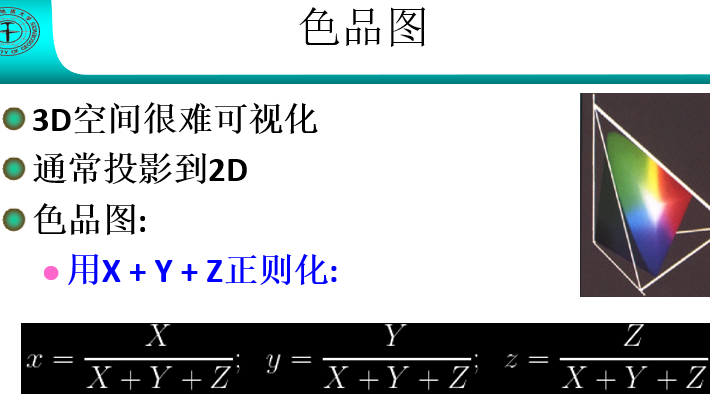
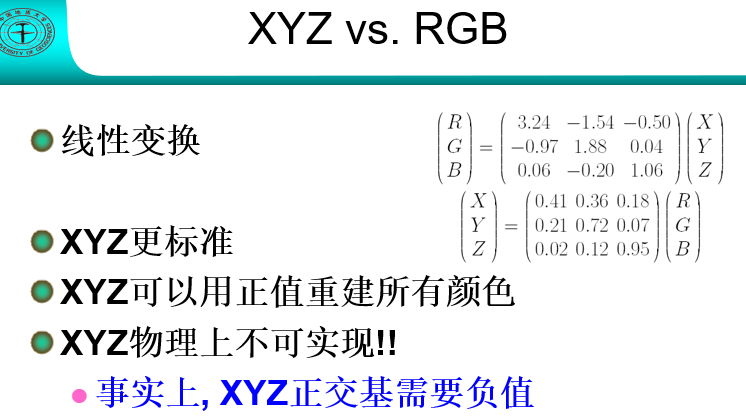
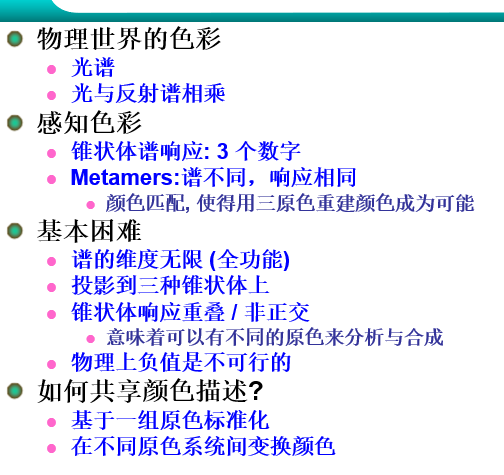
弹力：

限制长度最多增加10%

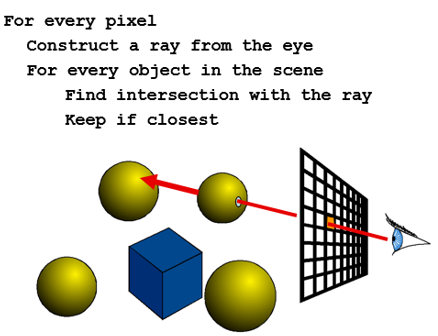
# 7.色彩的形成与感知

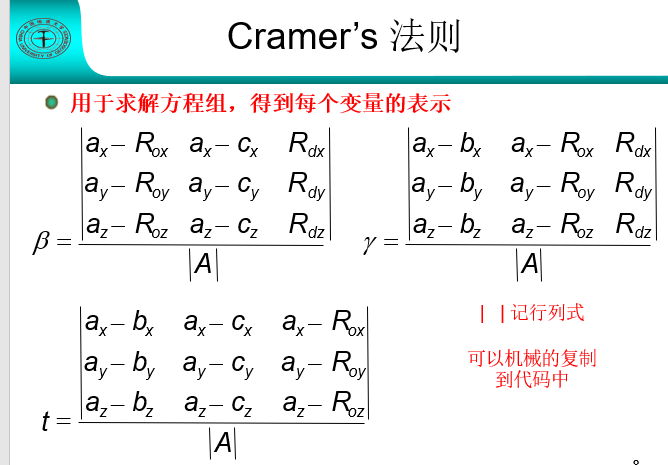
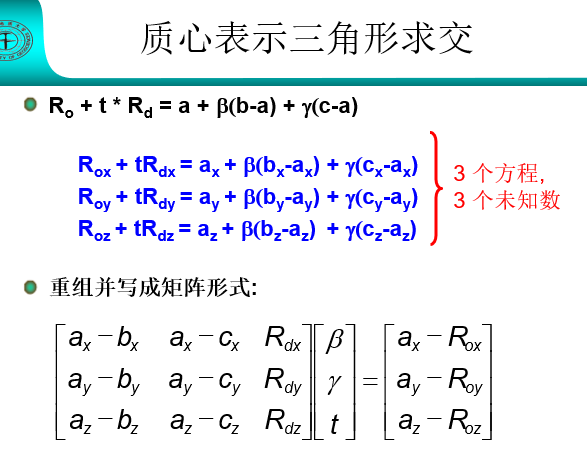
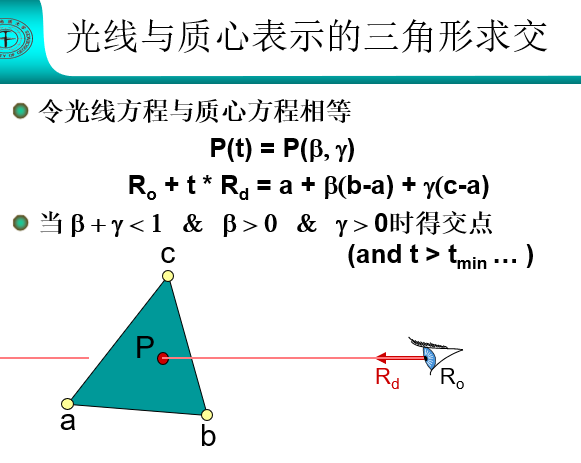
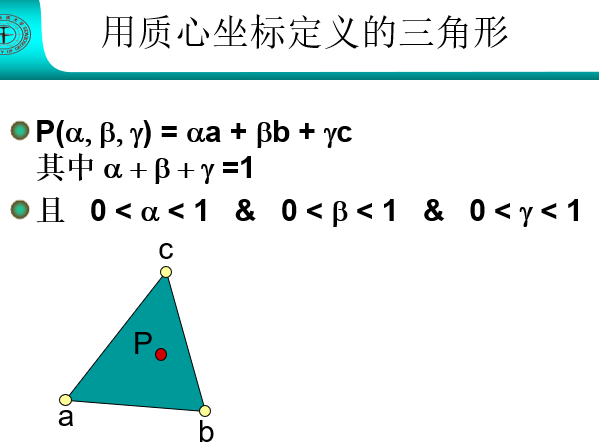
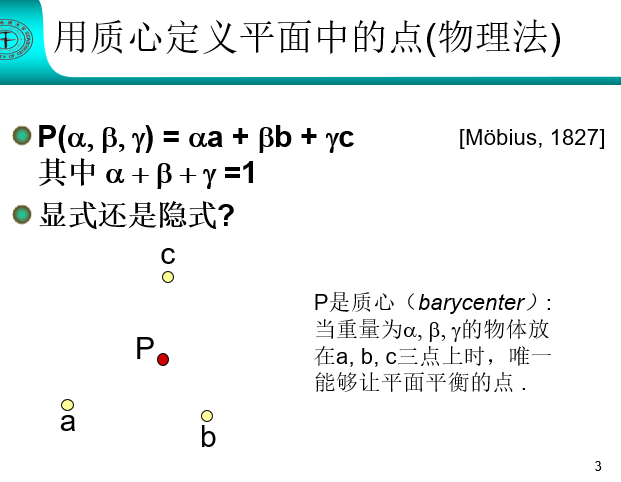
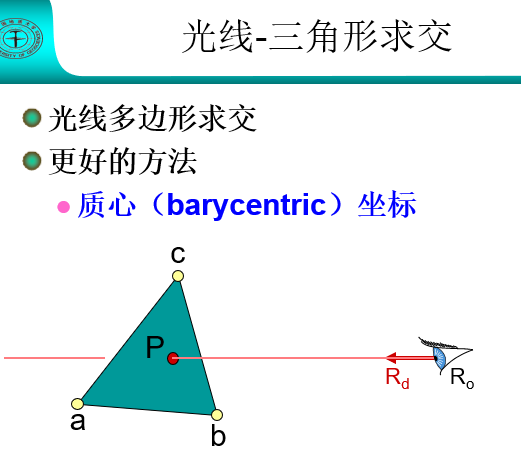
   

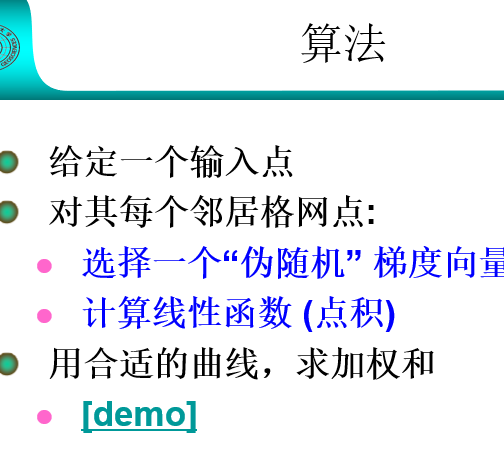
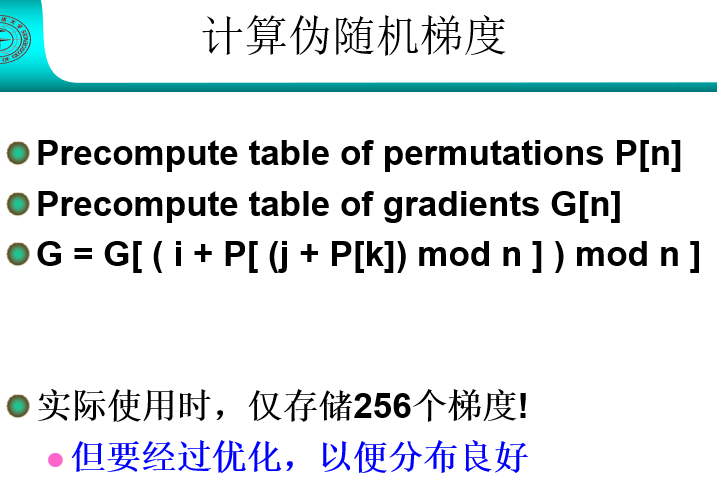
# 8.光线投射



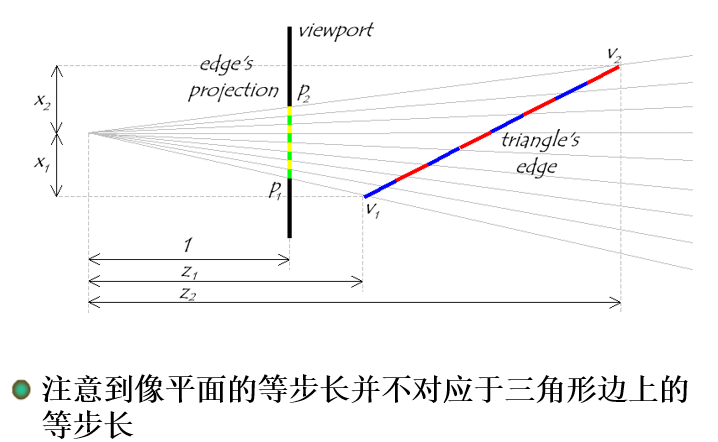


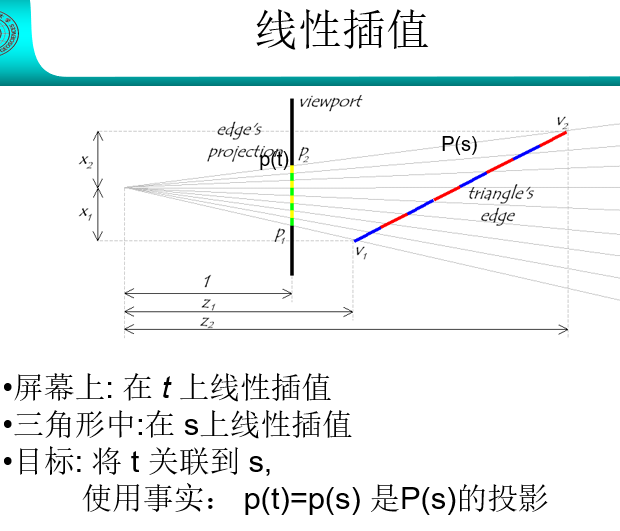
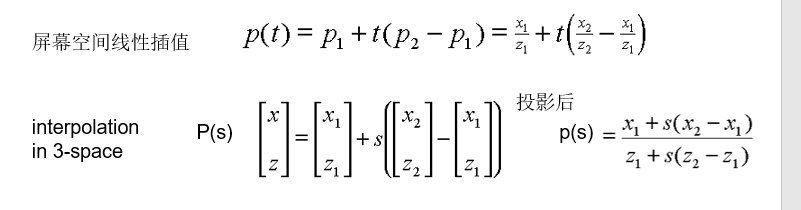
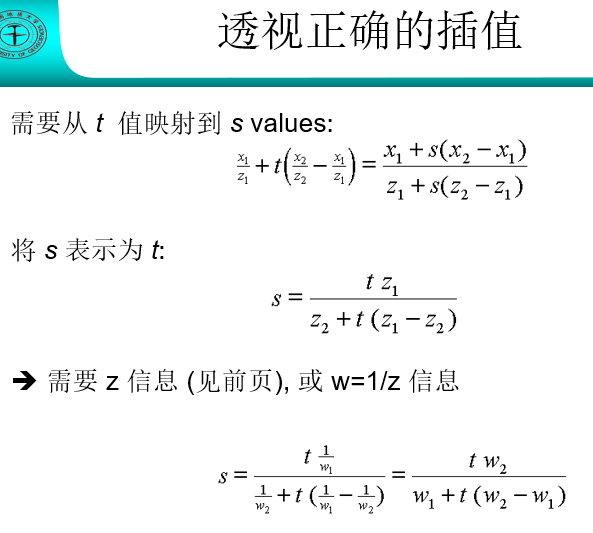
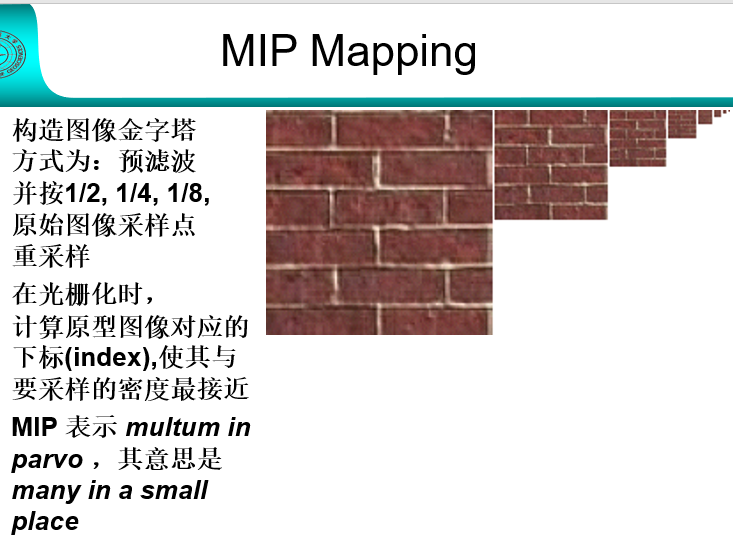
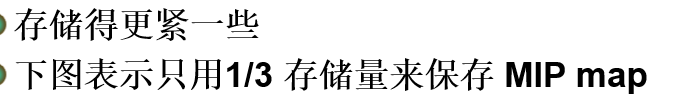
# 9局部光照与纹理

纹理：Perlin

纹理插值：错误：



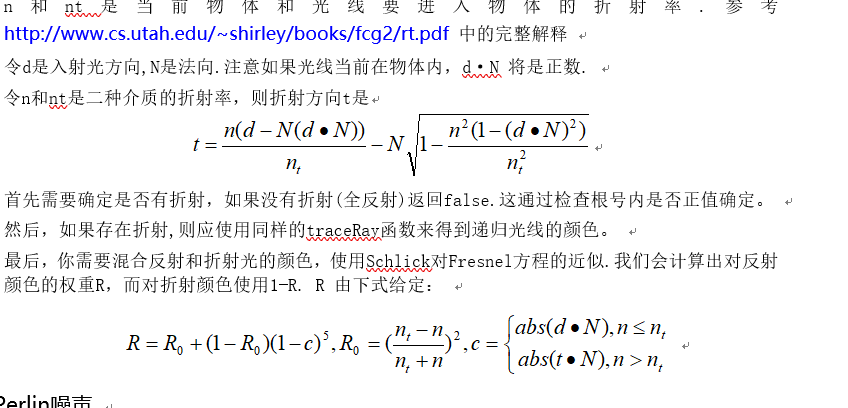
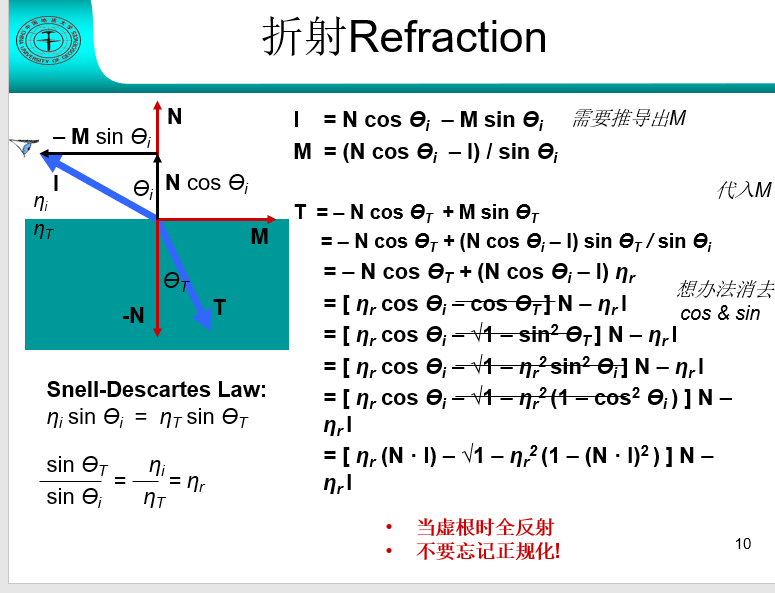
     

BRDF模型

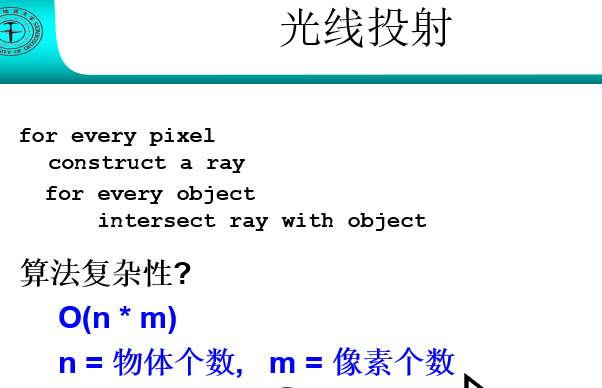
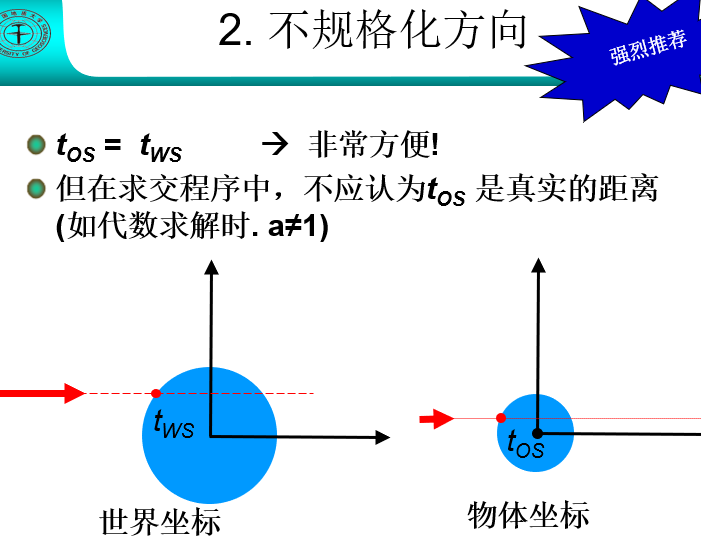
纹理映射

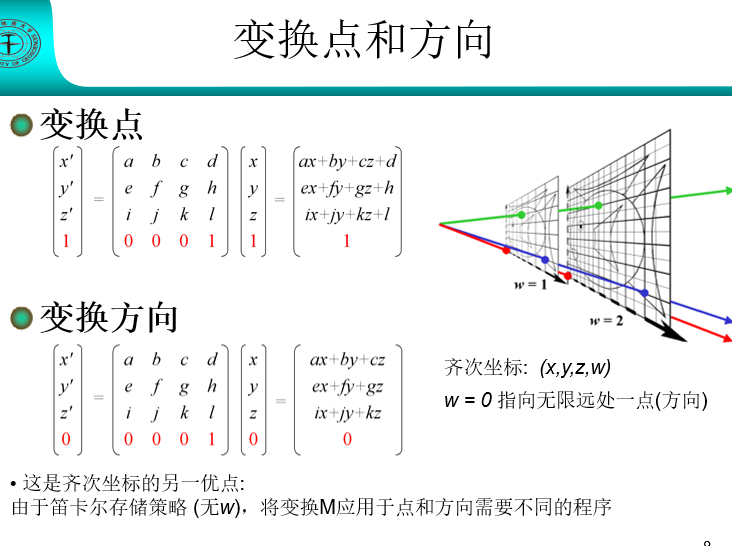
凹凸映射：纹理作为高度

法向映射：纹理直接编码法向

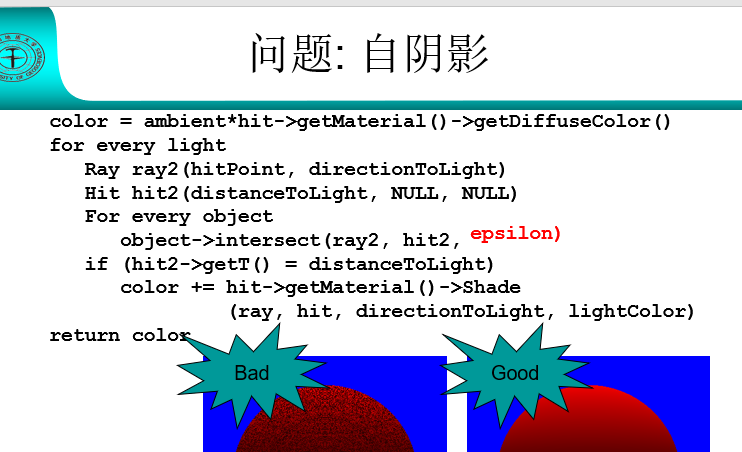


# 10光线跟踪

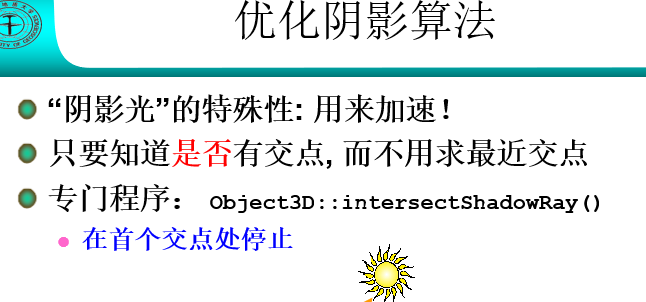


阴影：

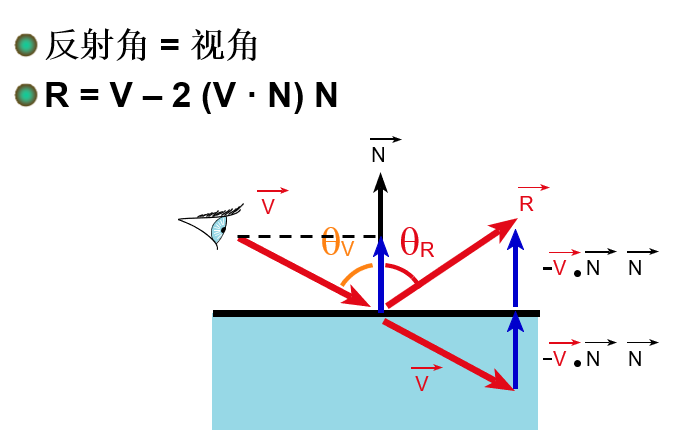
 

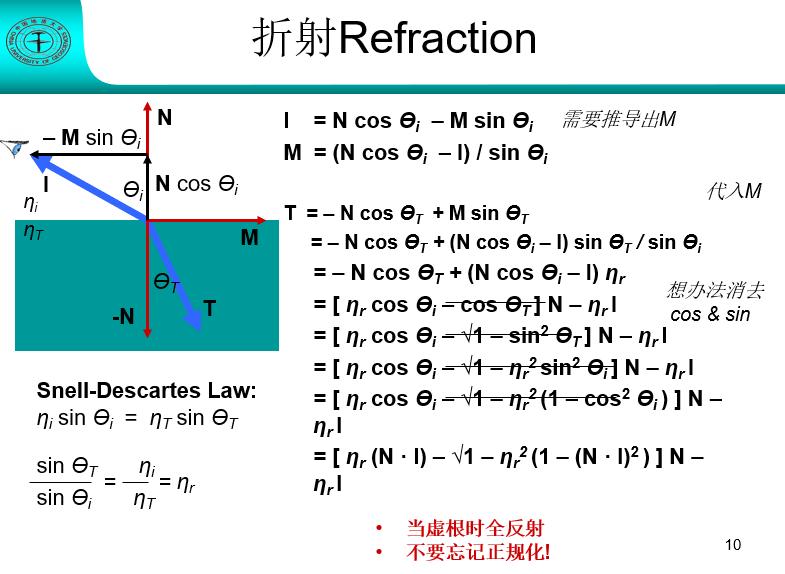
自阴影，tmin取一个值epsilon

阴影光只需看是否有交点，在遇到首个交点处停止

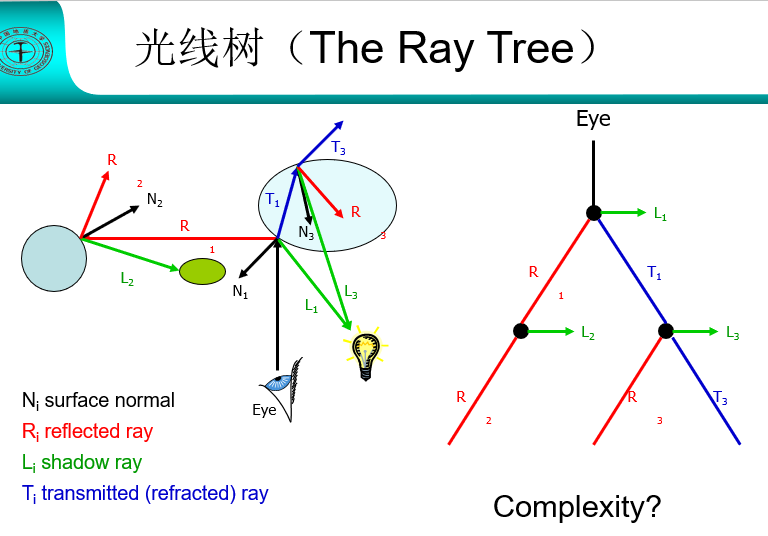
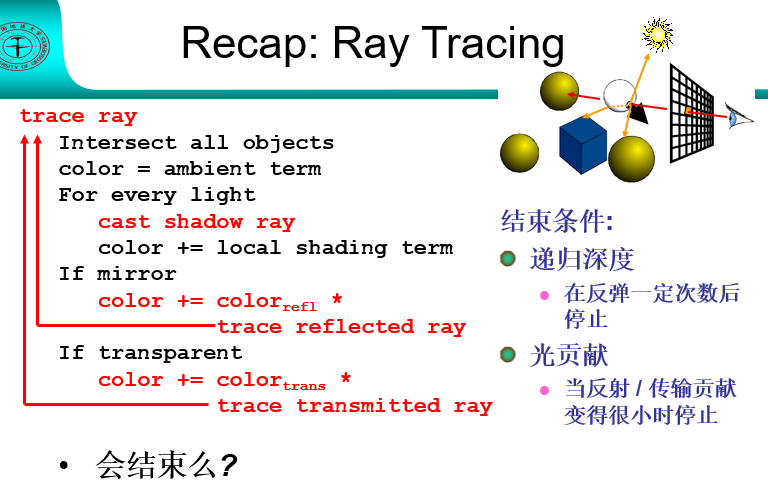


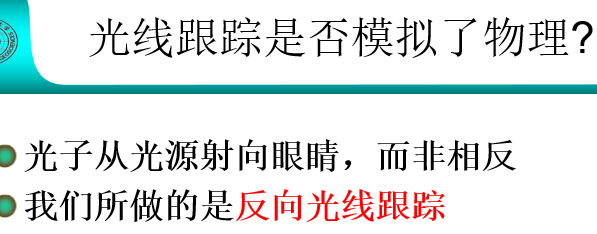
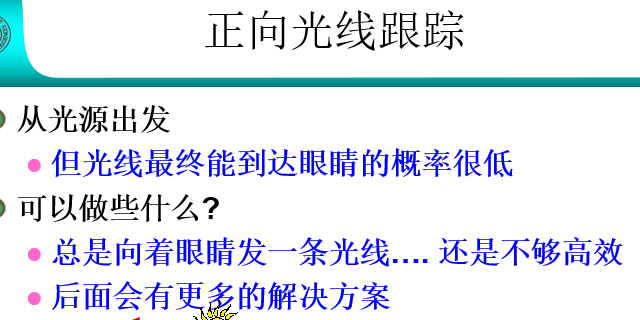
反射折射





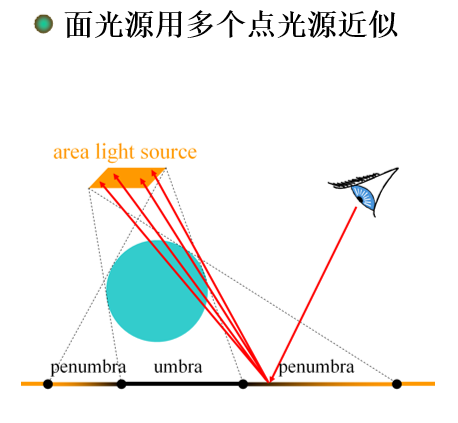
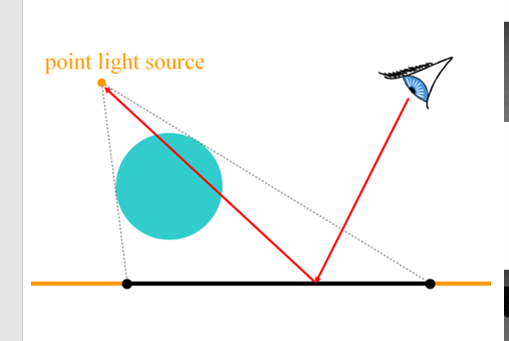
递归算法



反向光线跟踪 

# 11加速

阴影，面光源软阴影



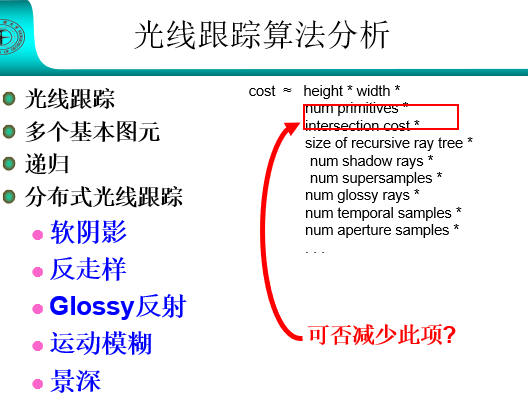
多点同时采样。

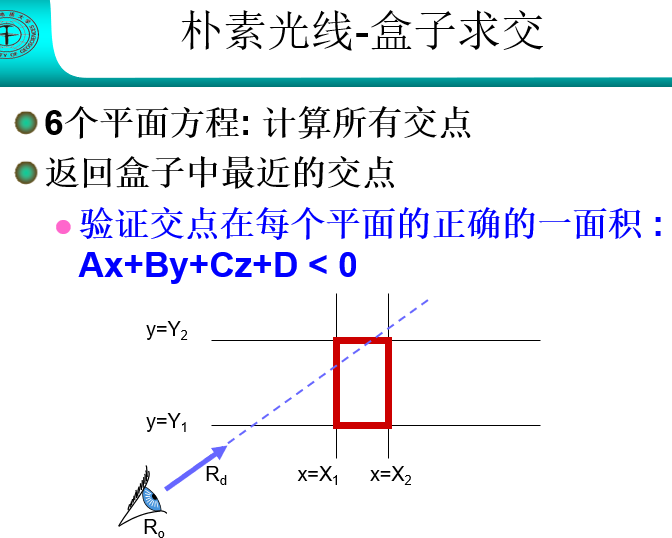
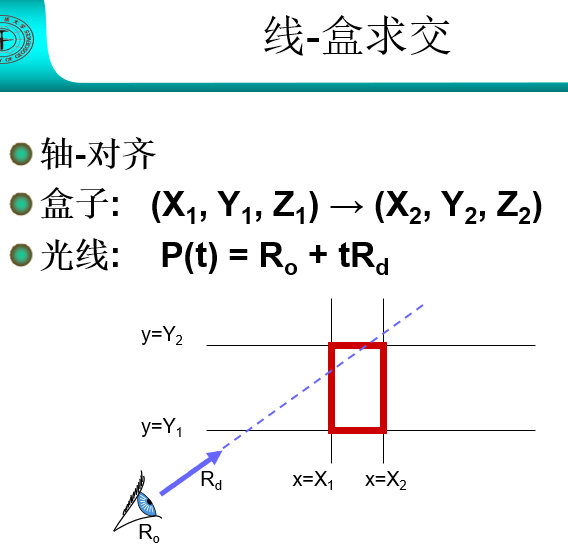
反走样

采样

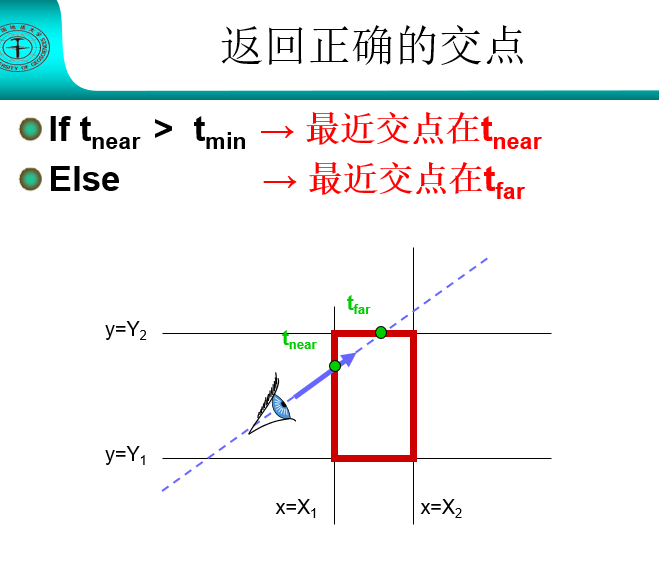
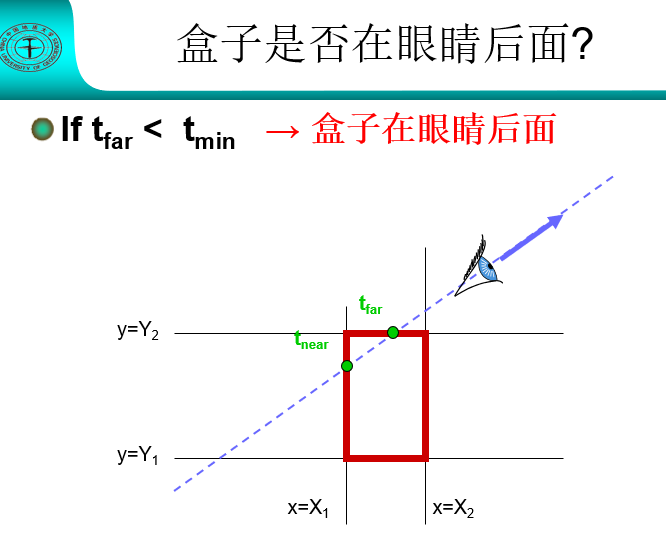
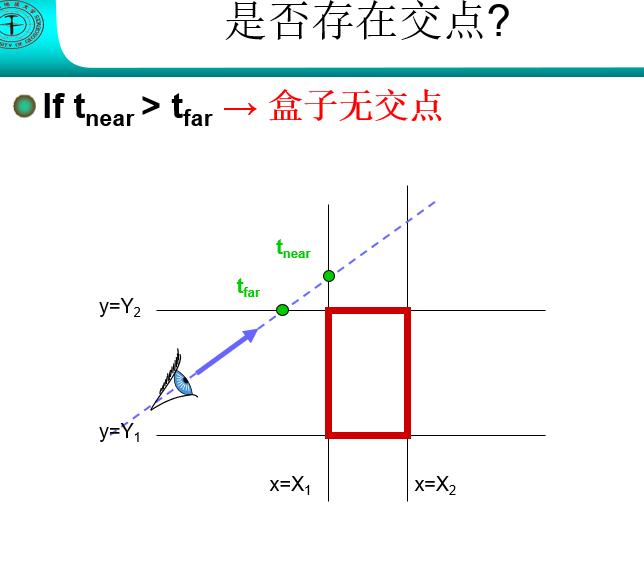
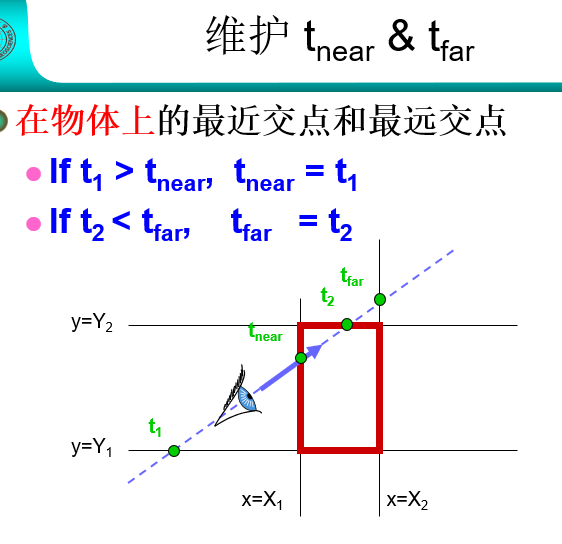
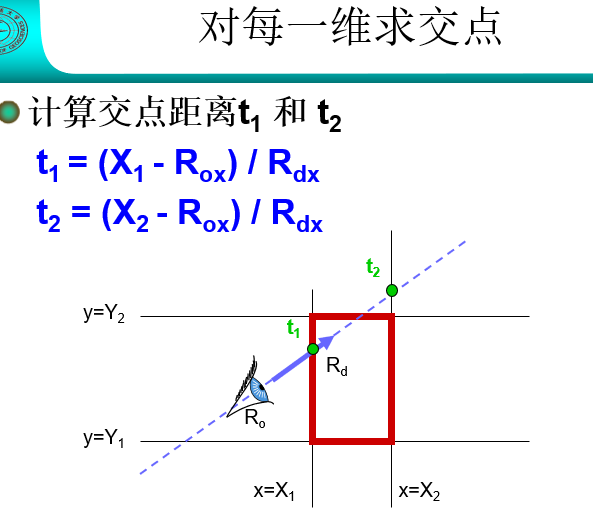
景深：焦距

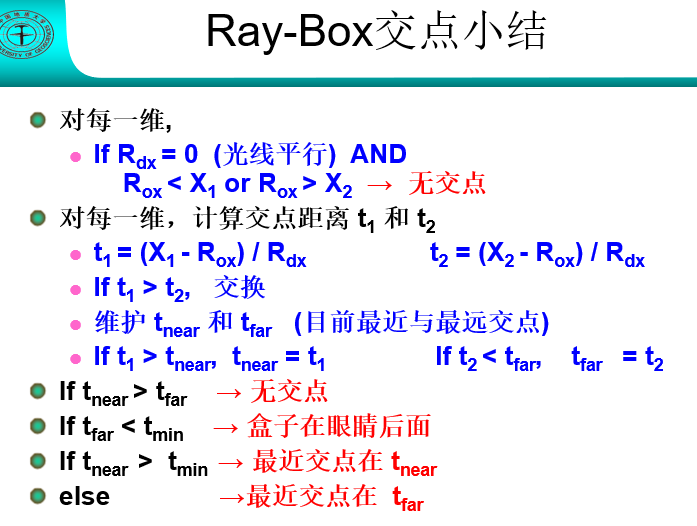
加速：减少光线。图元相交检测数。

包围盒，提前拒绝减少光线



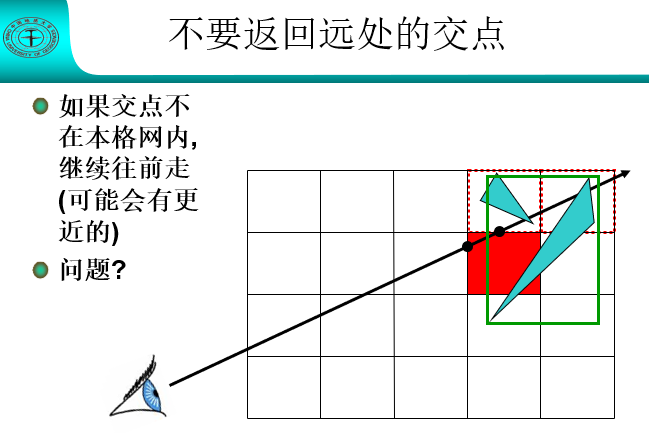
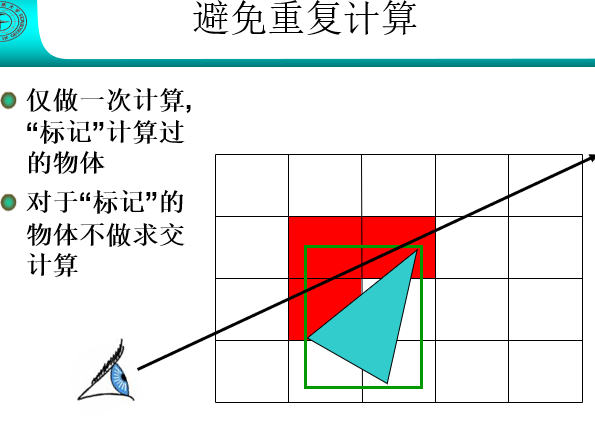
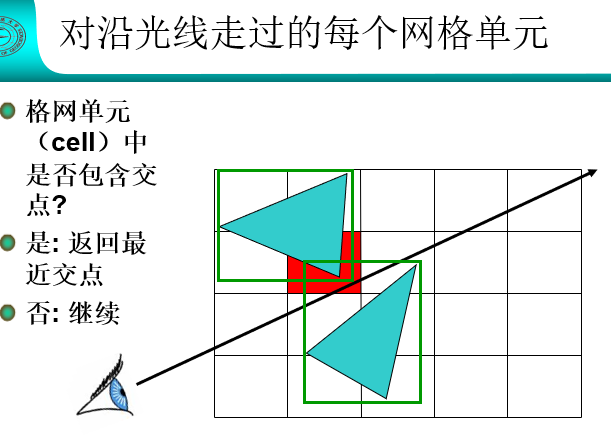
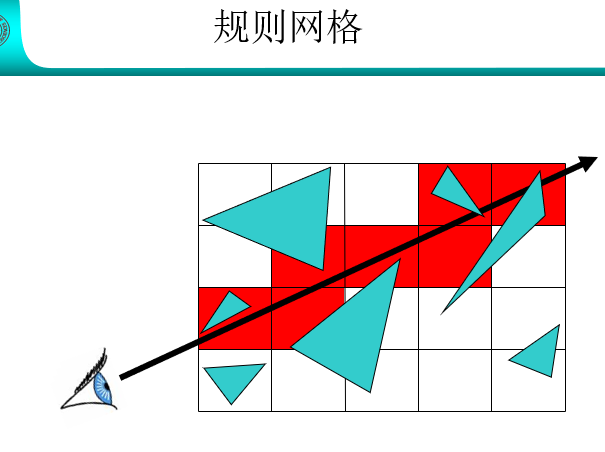
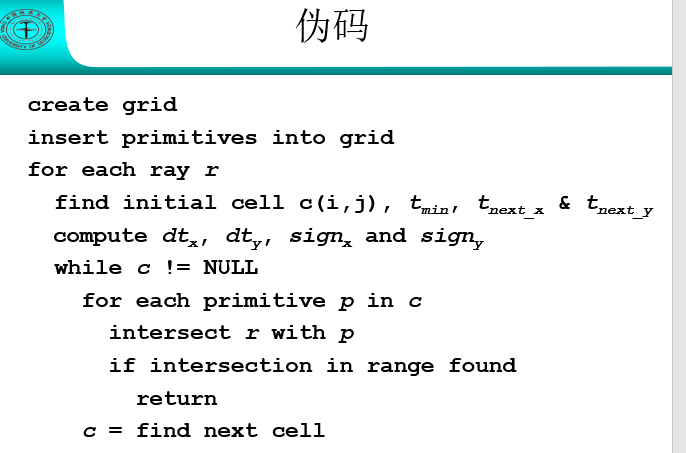
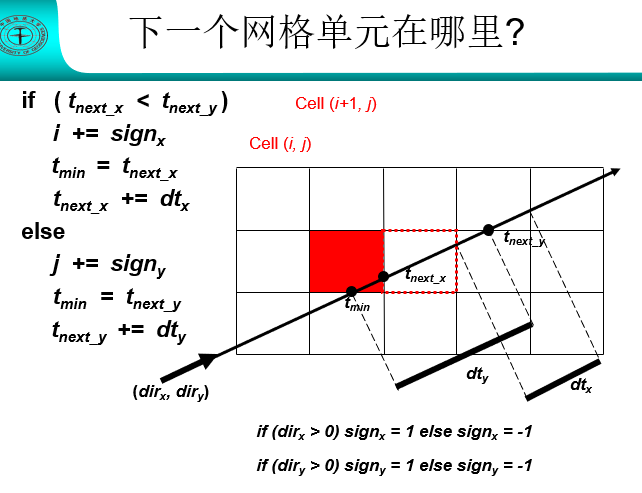
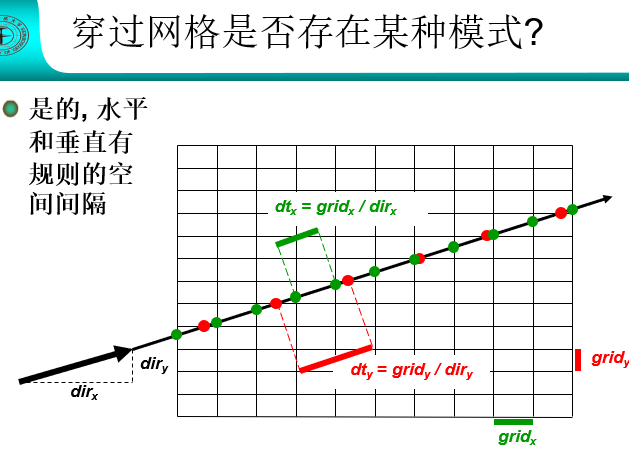
减少计算量：一对平面法向量相同，测试平行





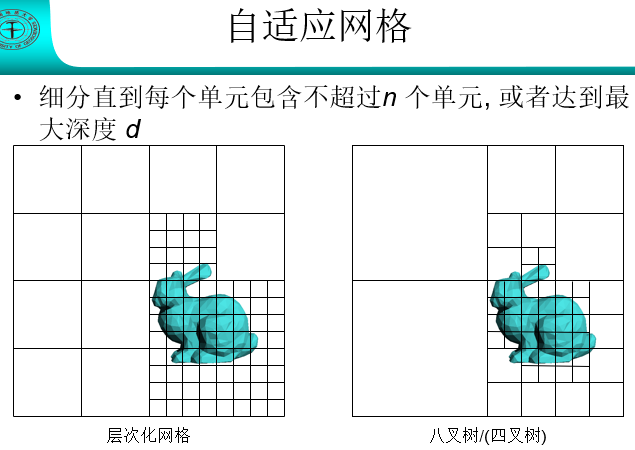
**空间数据结构加速**

**创建网格，在网格中插入图元。开始位置：外部，内部。**

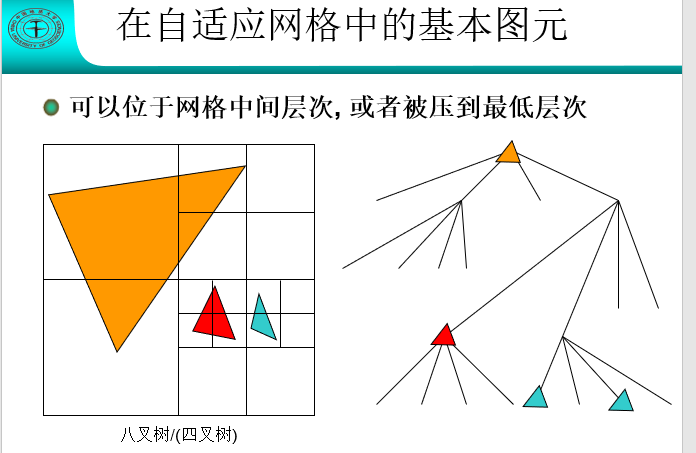
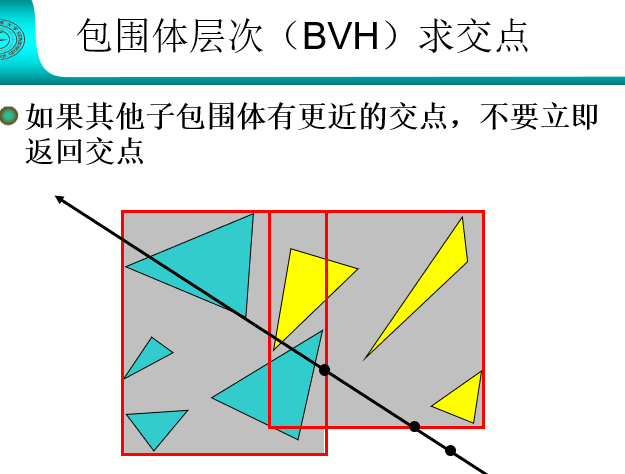
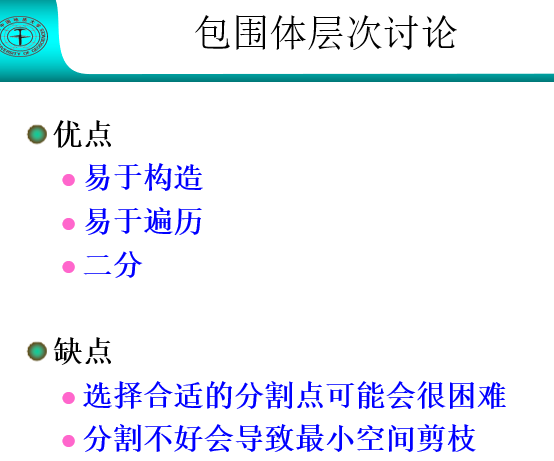
 

缺点：图元集中在少量网格中。优点:容易构造。

自适应



* **优点?**
  + **网格复杂性与空间密度匹配**
  + **遍历更耗时 (特别是八叉树)**
  + 

# 12走样

类型：锯齿边界，渲染细节错误，纹理映射。

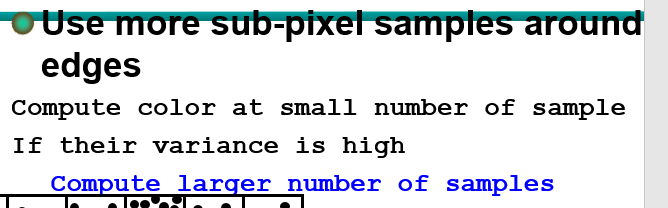
抖动采样

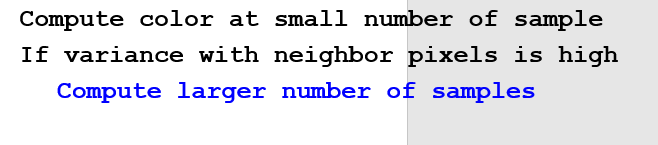
滤波器，卷积滤波，三角，盒子滤波。

适应采样：

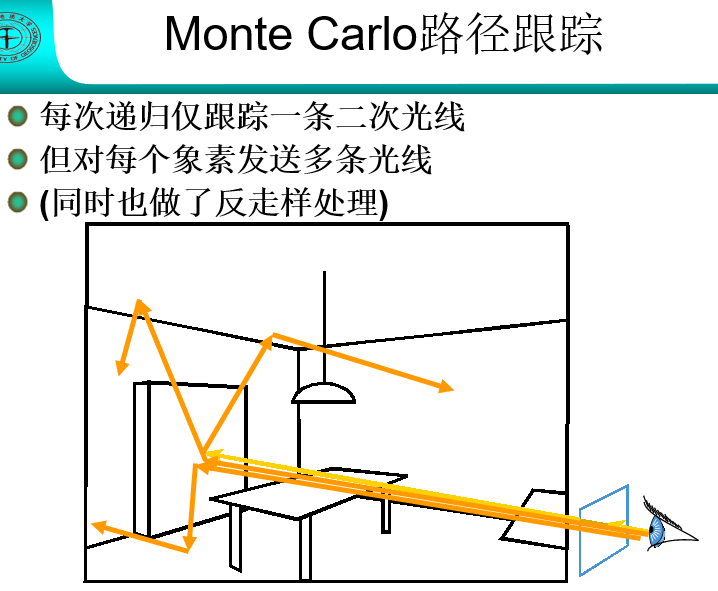
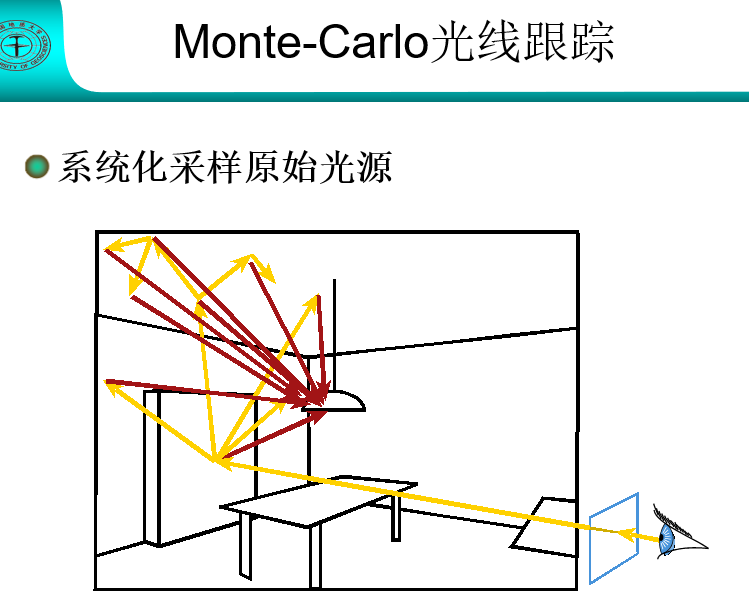


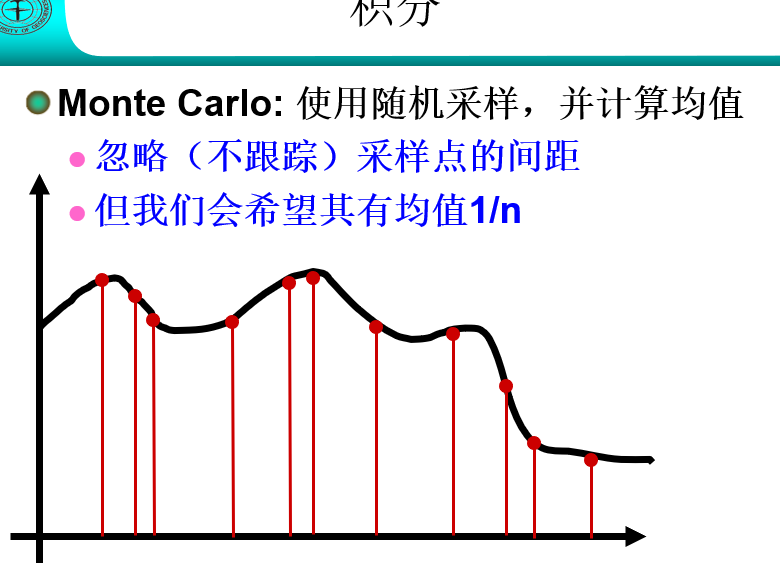
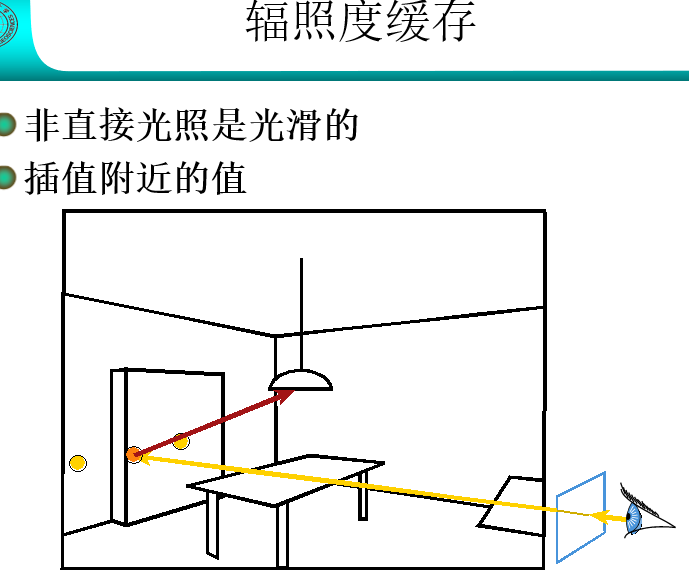
超采样：



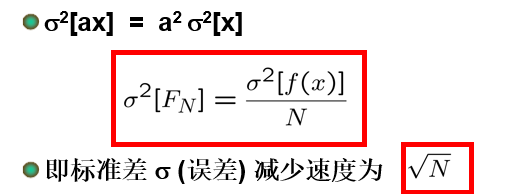
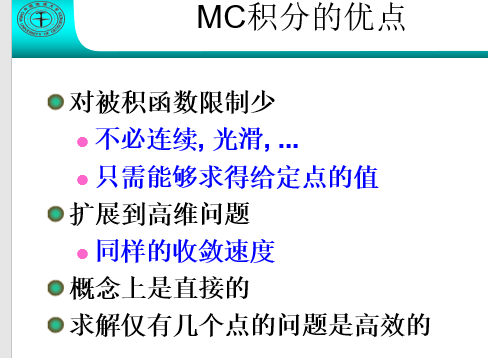
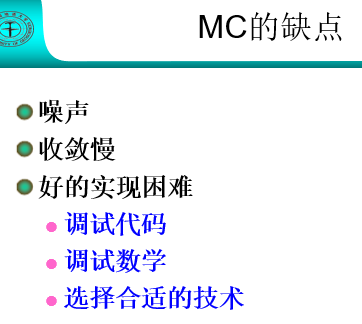


# 13蒙特卡洛



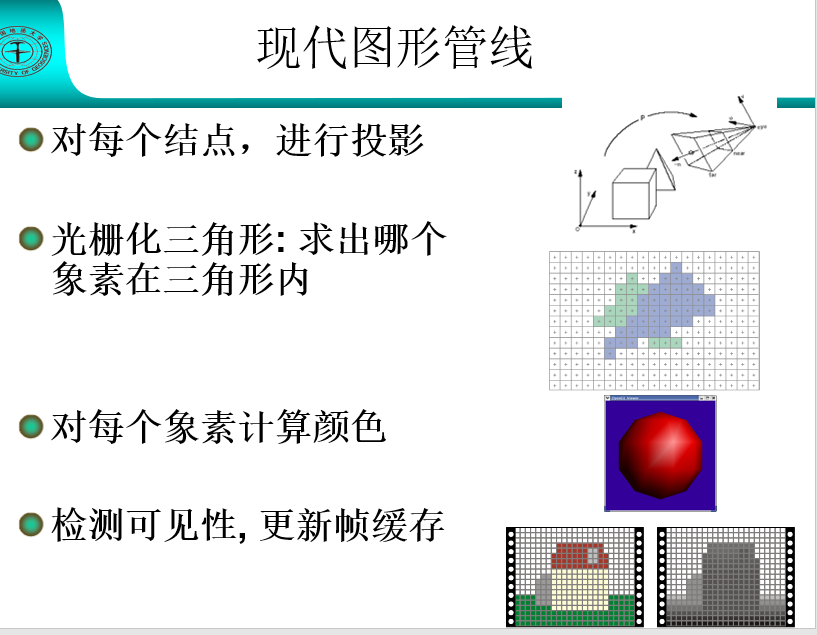


有导向的积分：重要性采样

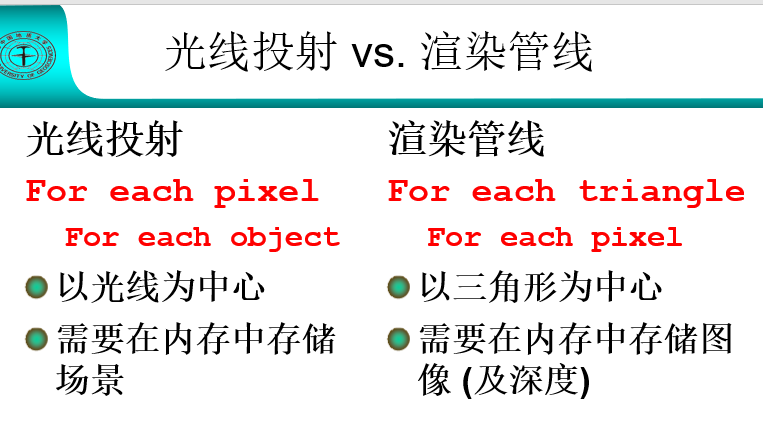
  

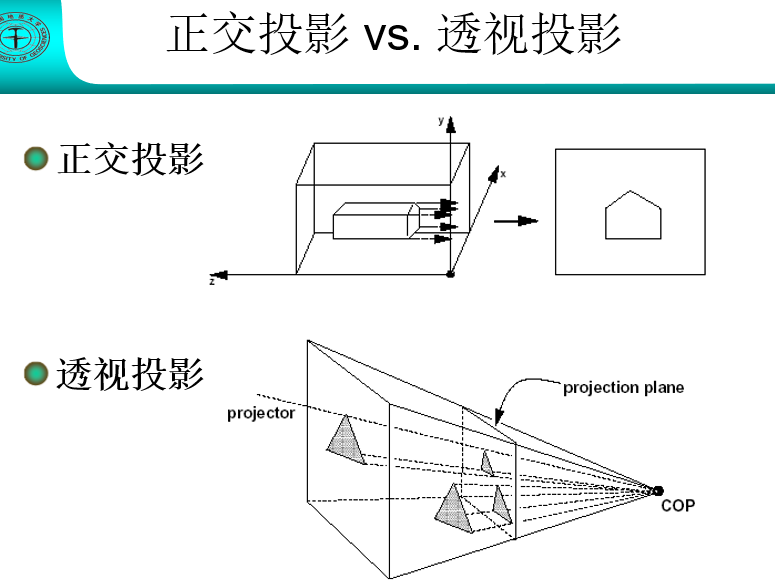
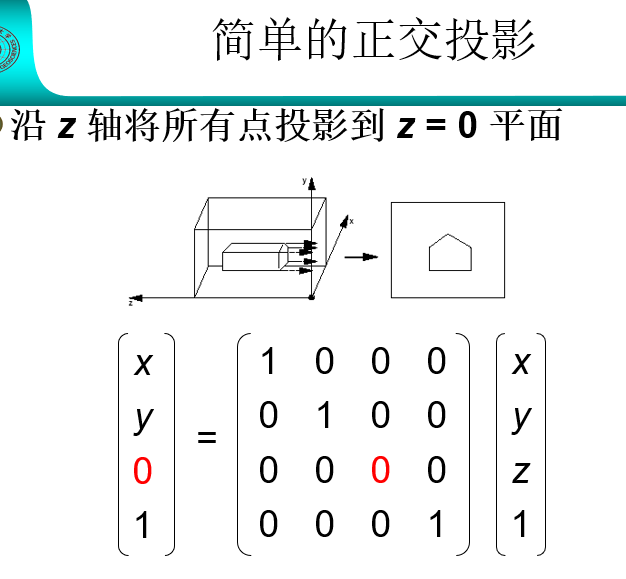
# 14图形流水线

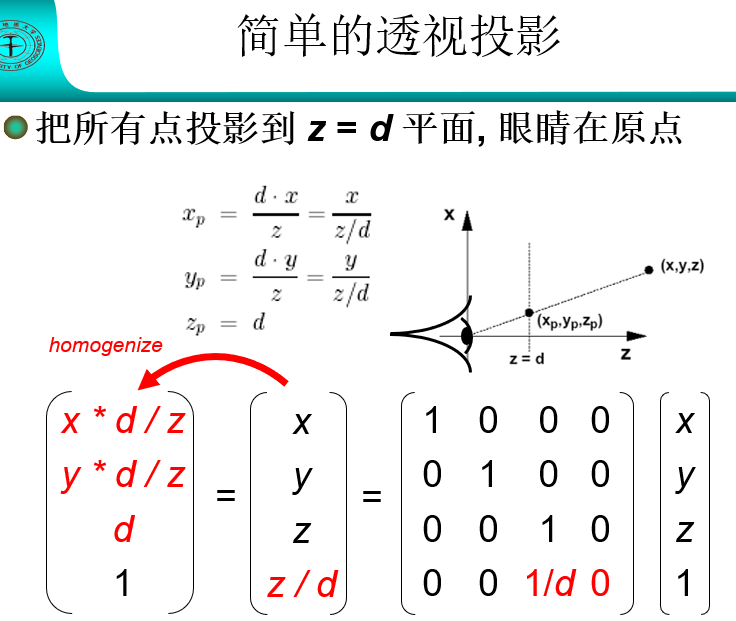
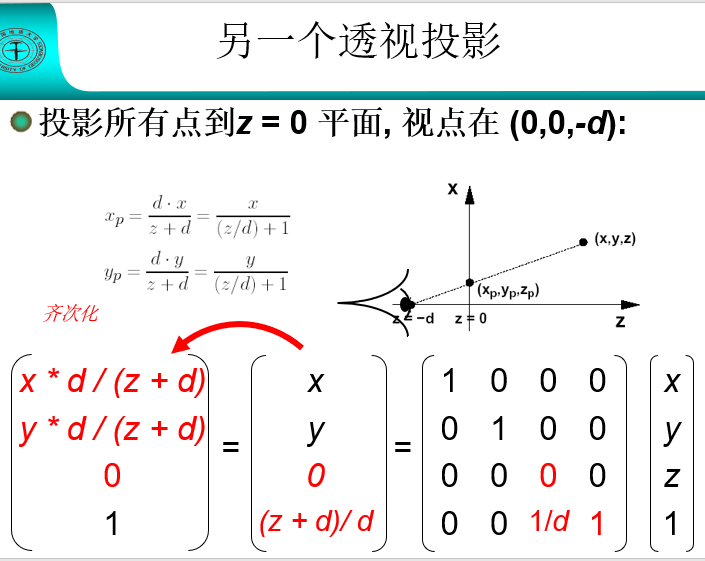
投影，光栅化，像素计算，可见性。

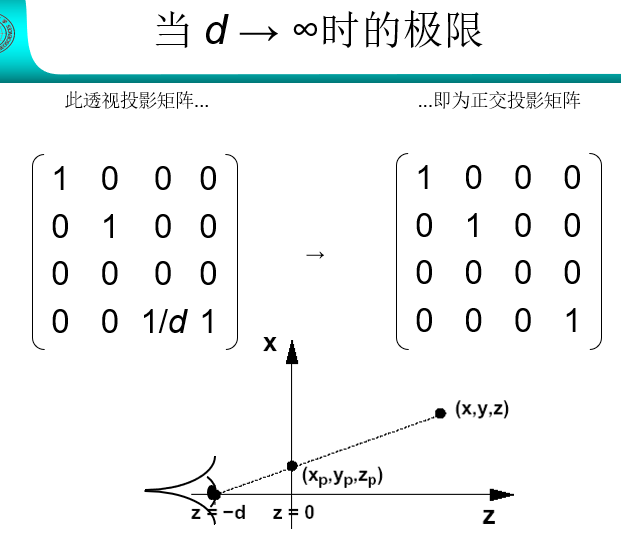




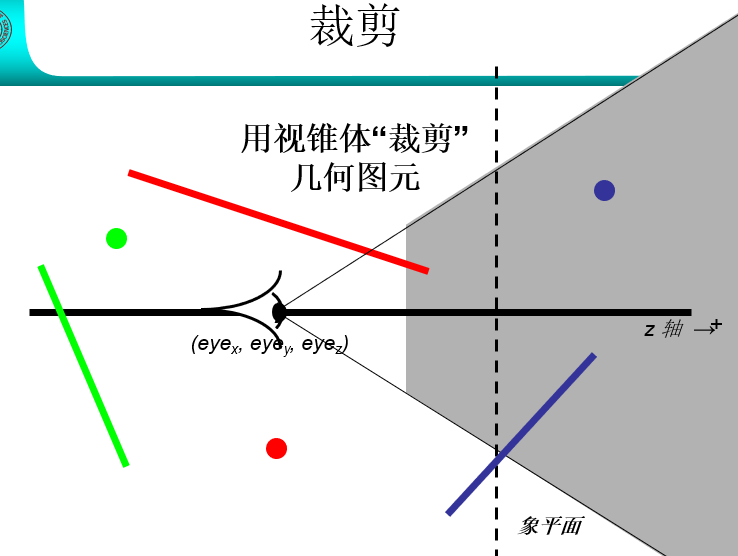




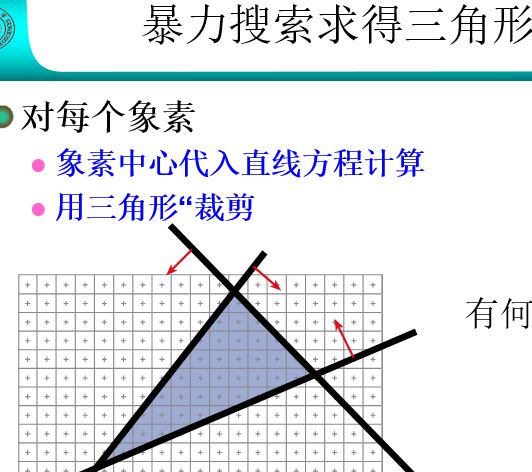
Pz.>eyez pz<eyez 眼睛后面会到前面，pz=eyez，垂直，无限。

光栅化：

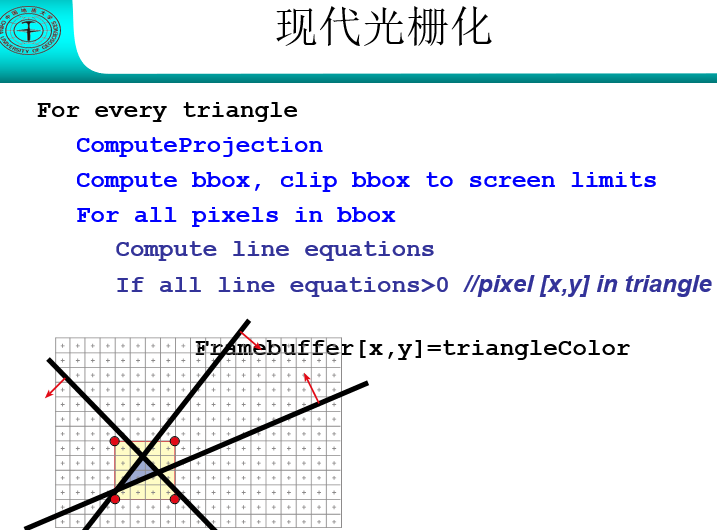
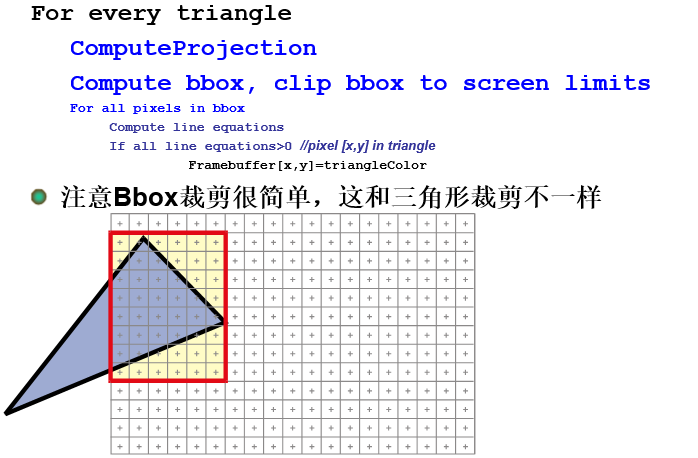
离散节点（三角形）

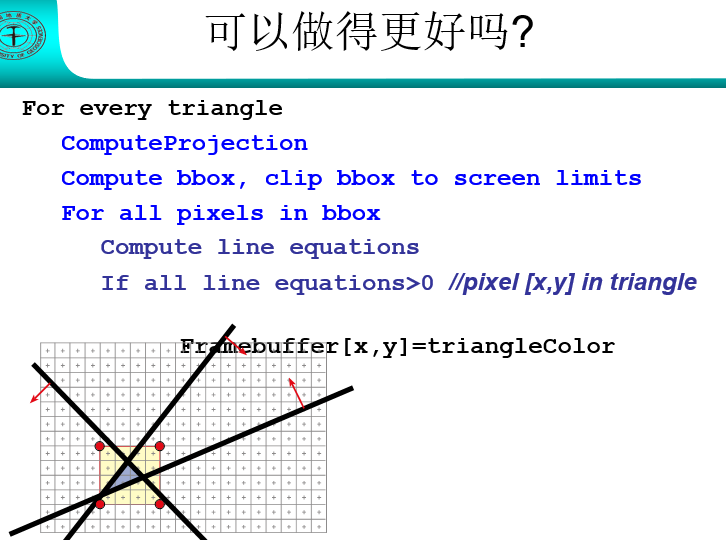
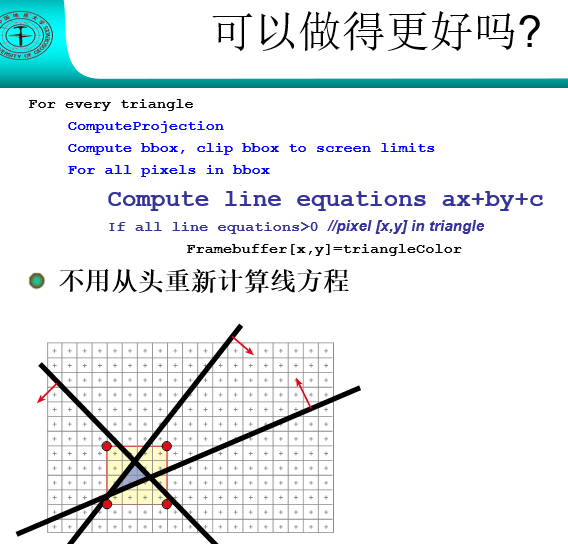
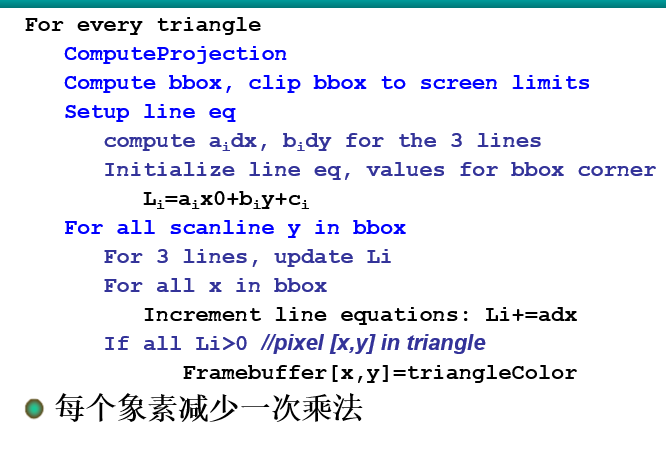
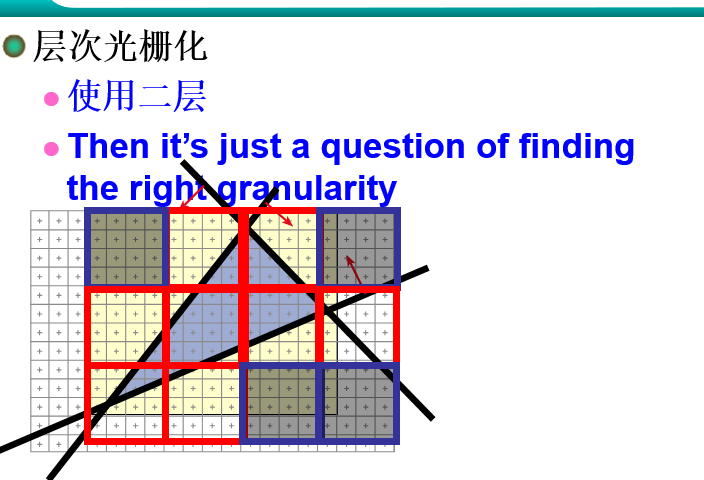
计算离散计算离散近似结果。

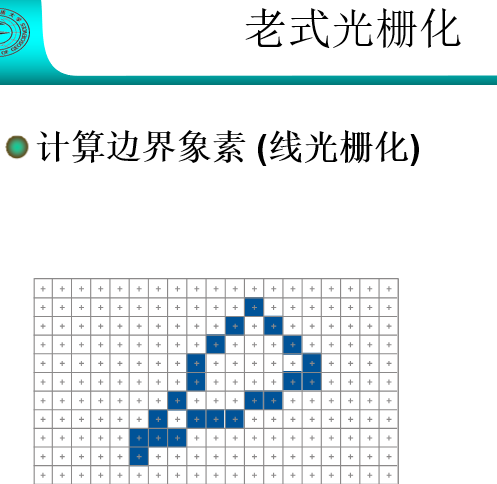
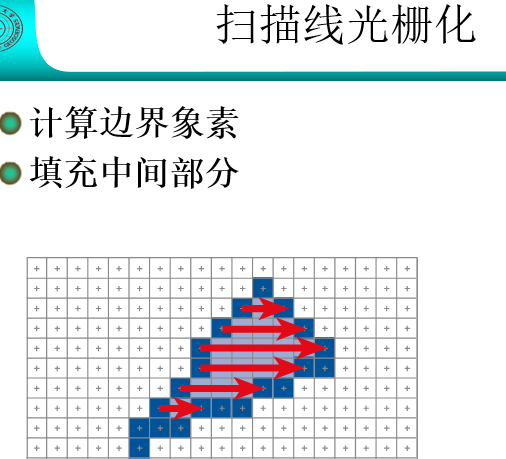
三角形太小会浪费计算。

包围盒。

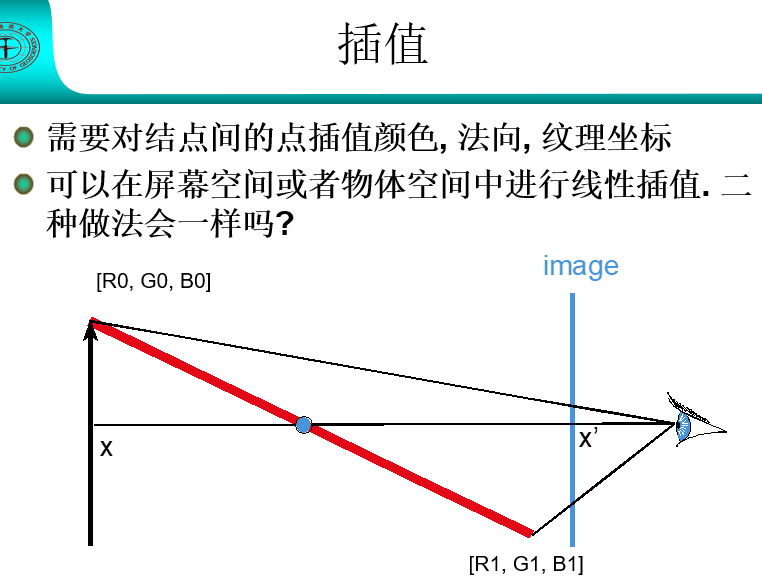
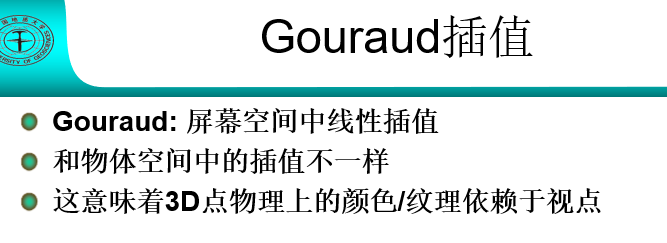
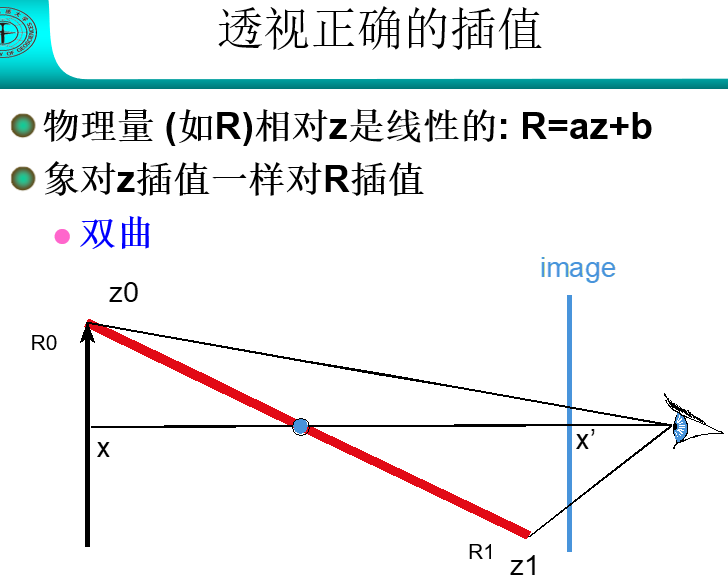
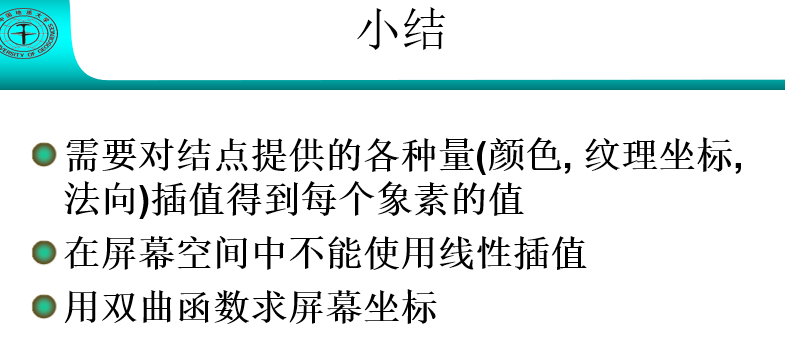
现代显卡：暴力。

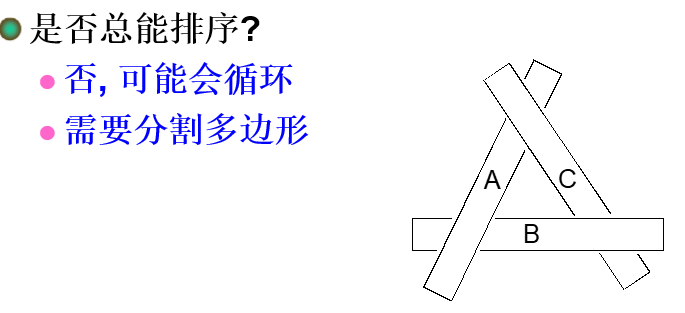
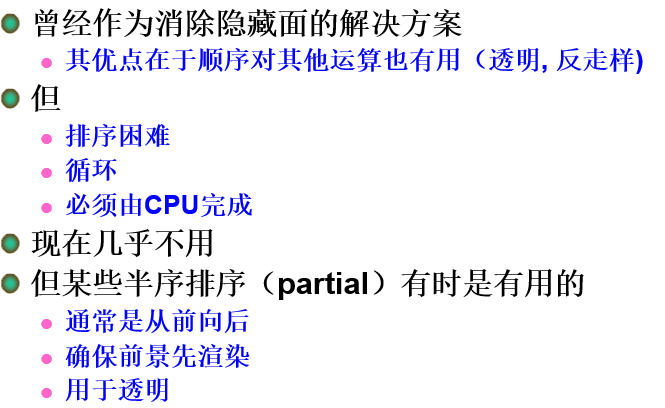
 

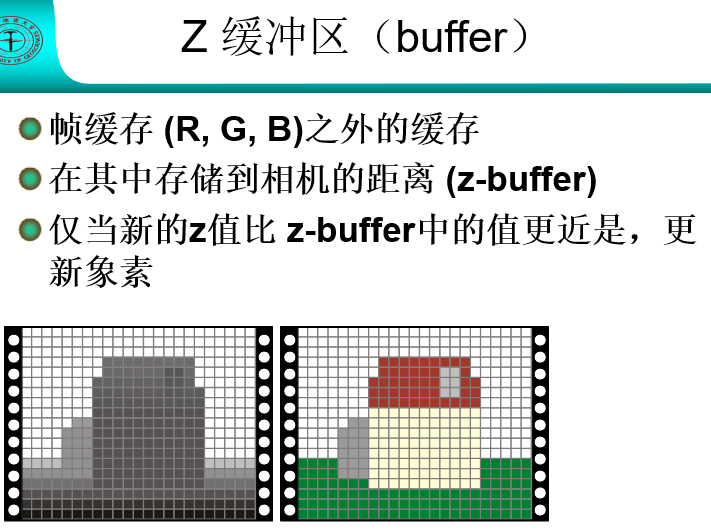
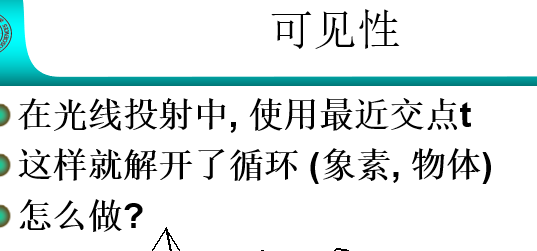
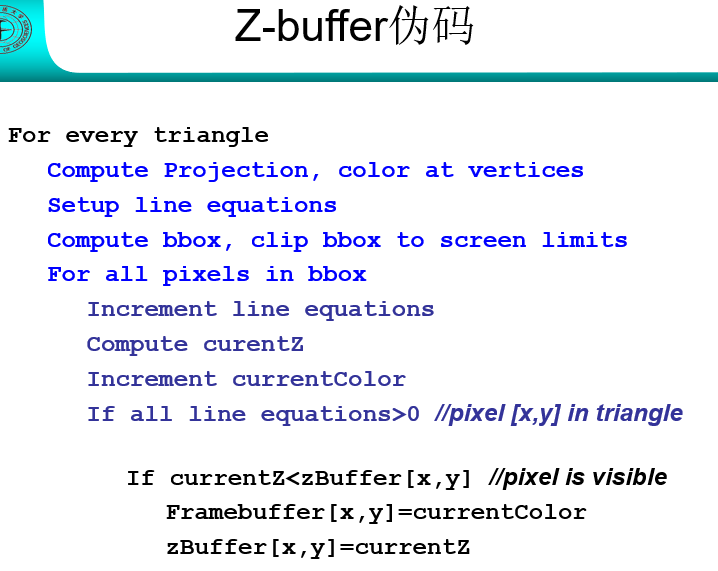
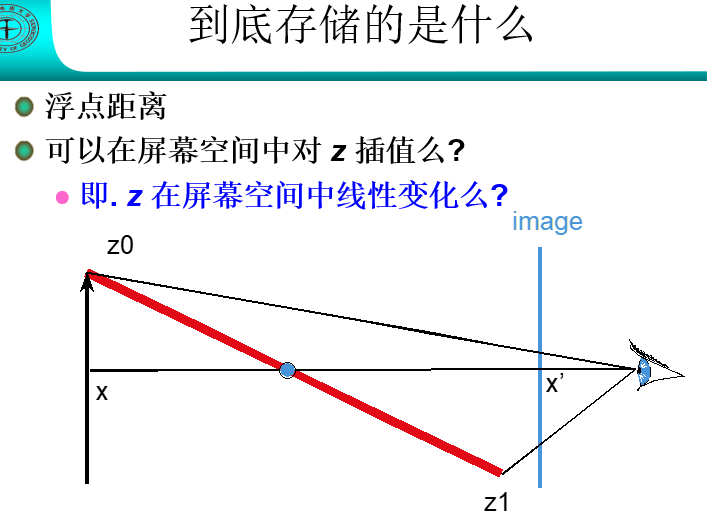
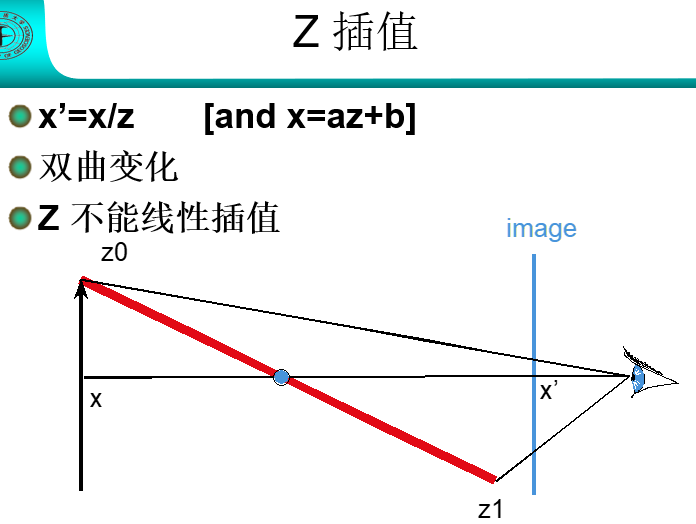
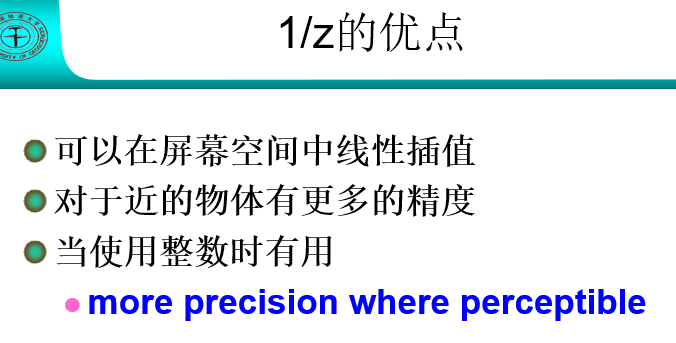
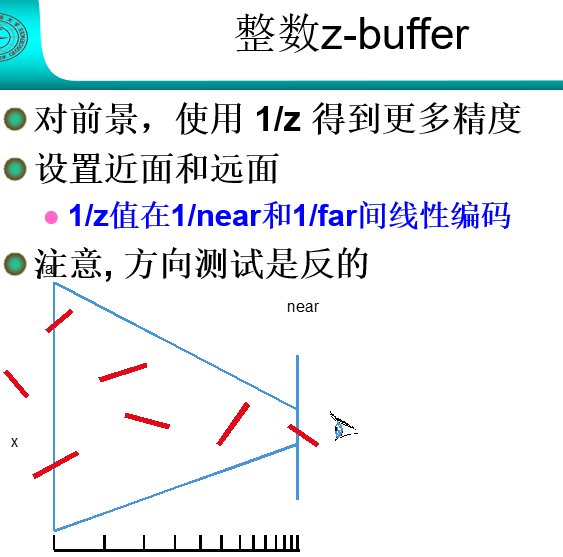
像素计算

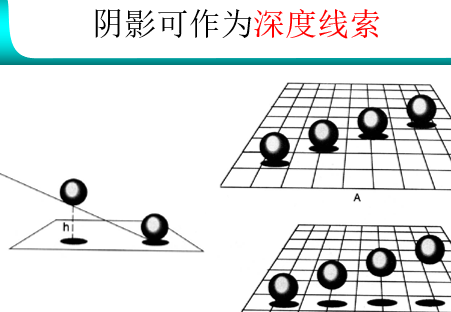
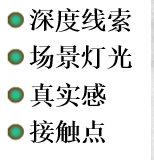
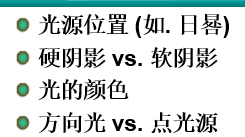
可见性：

画家算法，从后往前画。保留最近物体交点。

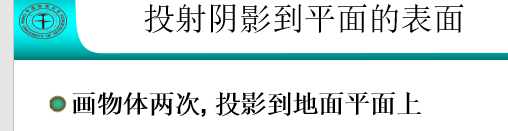
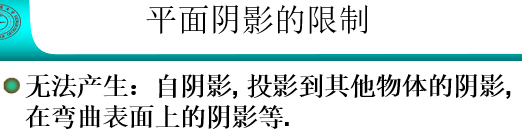
 

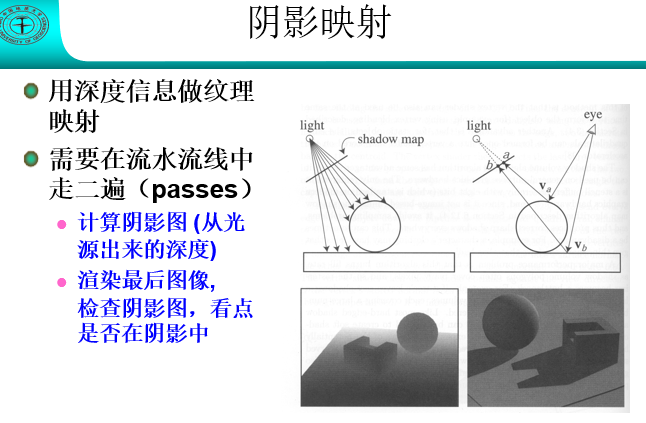
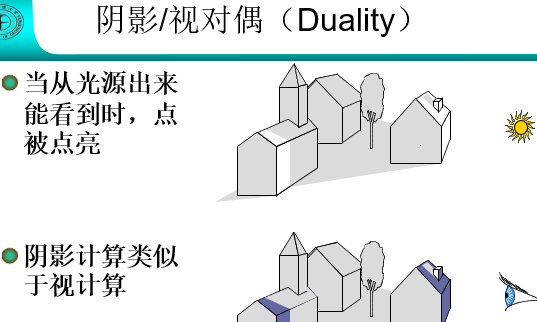
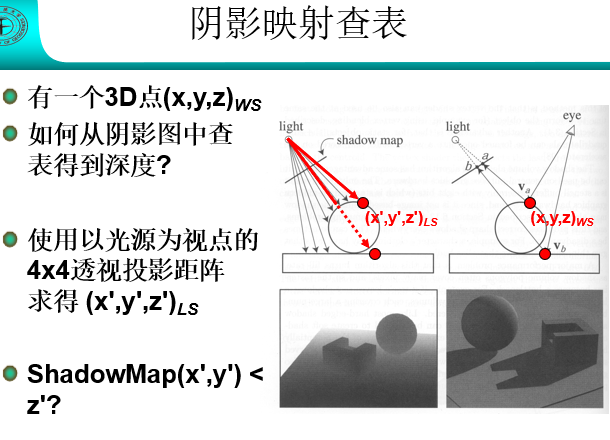
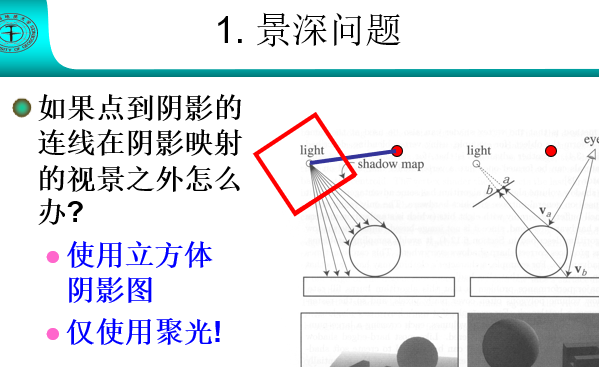
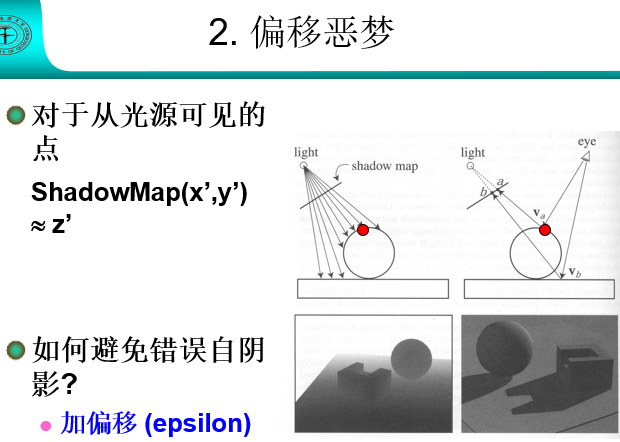
     

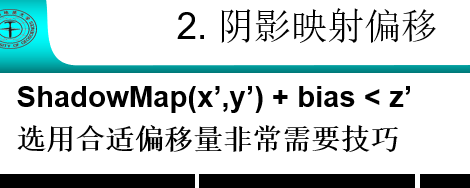
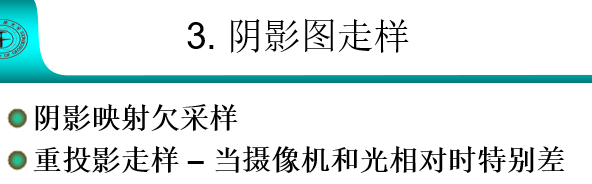
# 15实时阴影

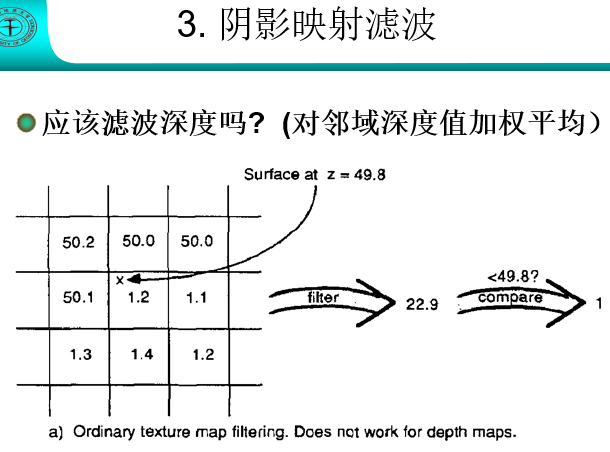
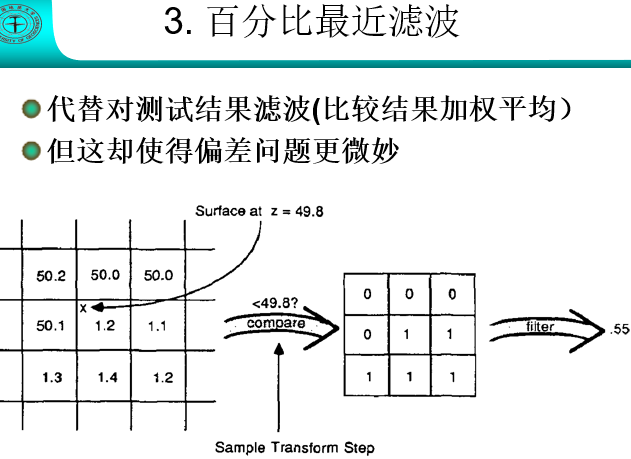
 

平面阴影

阴影体：

