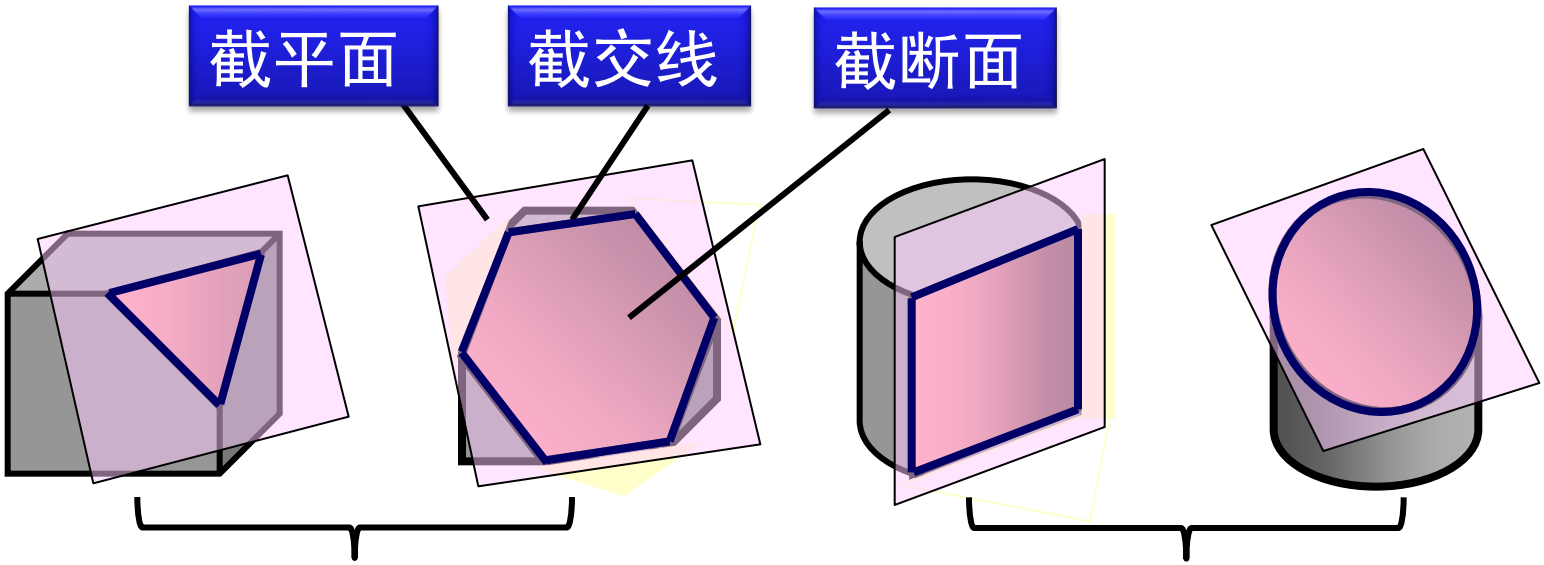
平面与立体相交

一、平面体的截切
二、回转体的截切

截切：用一个平面与立体相交，截去立体的一部分。



截平面∩立体表面 = 截交线（共有线）

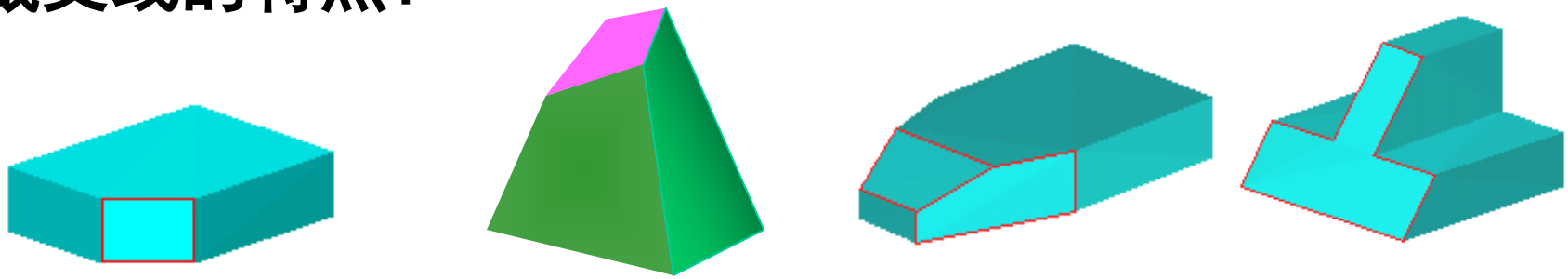
截平面∩立体 = 截断面

截交线的形状取决于：

- 形体的形状
- 截平面对形体的截切位置

一、平面体的截切

截交线的特点：



- 封闭的平面多边形
- 边数处决于交线的数目
- 公有性

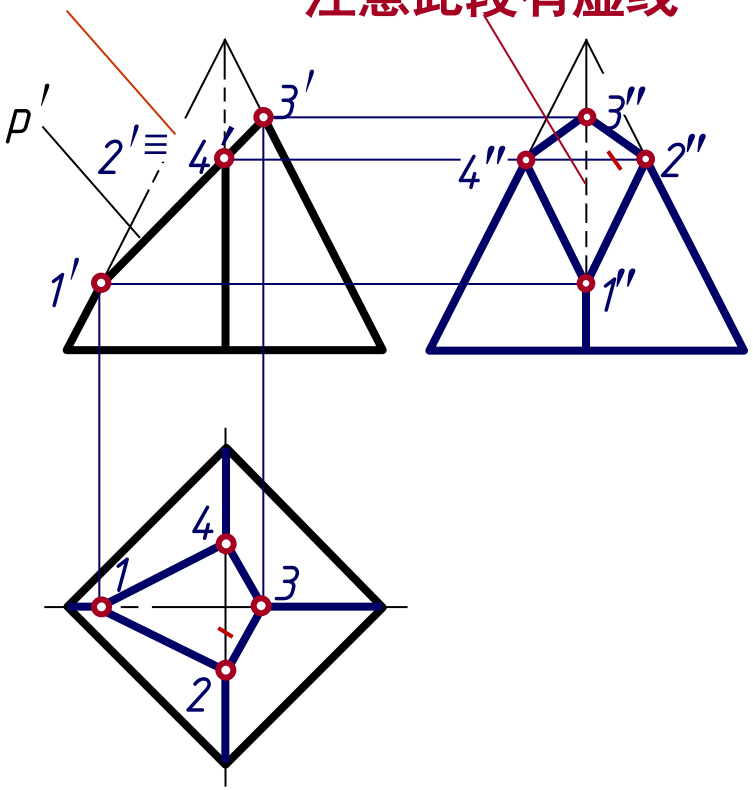
求法：

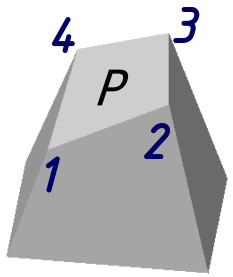
- **棱线法：** 求各棱线与截平面的交点，然后连接而成。
- **棱面法：** 求各棱面与截平面的交线，然后连接而成。

例：正四棱锥被正垂面P所截，完成其俯视图和左视图。

细双点画线表示假想的轮廓

注意此段有虚线



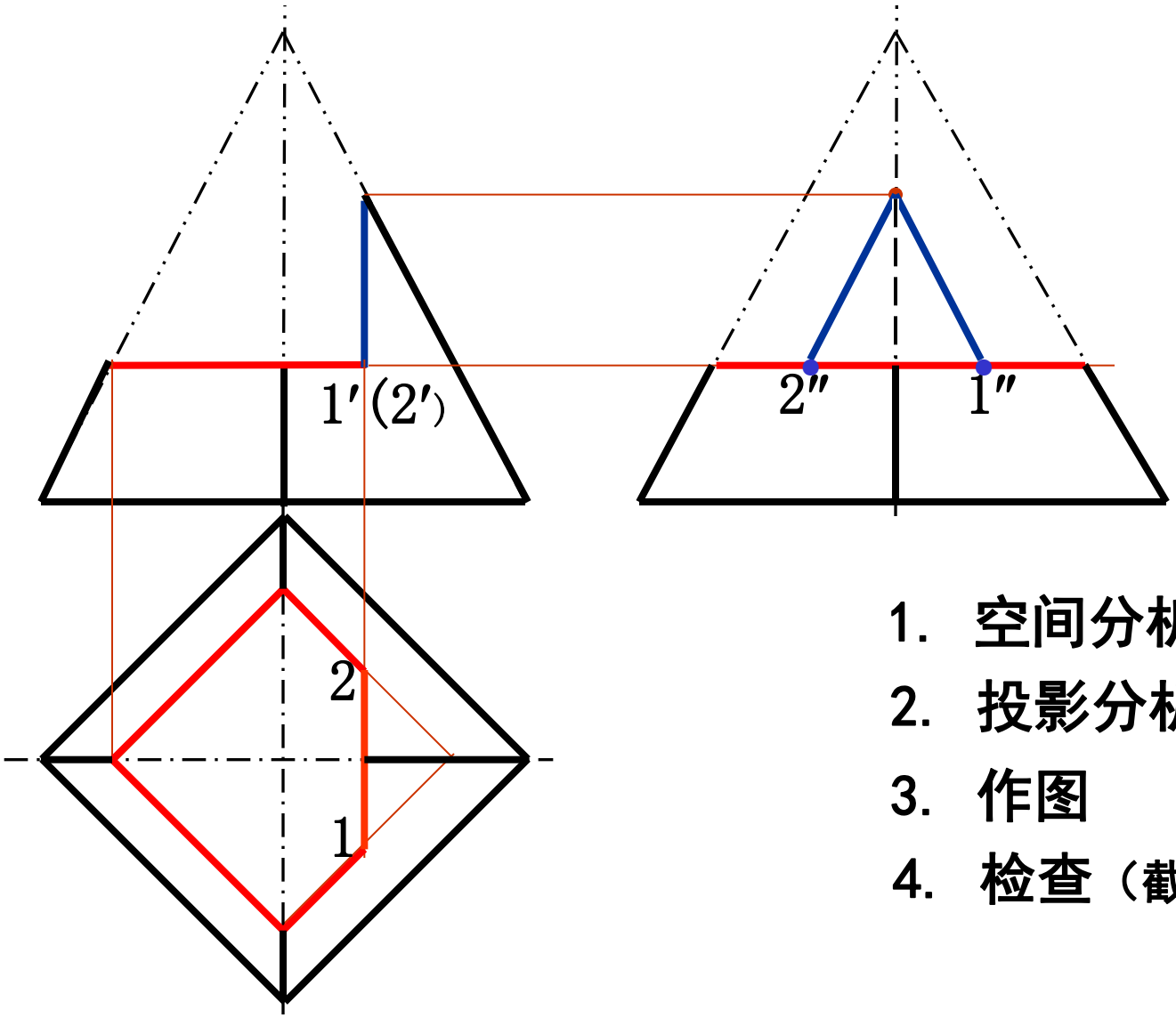


1. 空间分析：截交线的空间形状
2. 投影分析：截交线的已知投影
3. 作图
4. 检查

   截断面、棱线

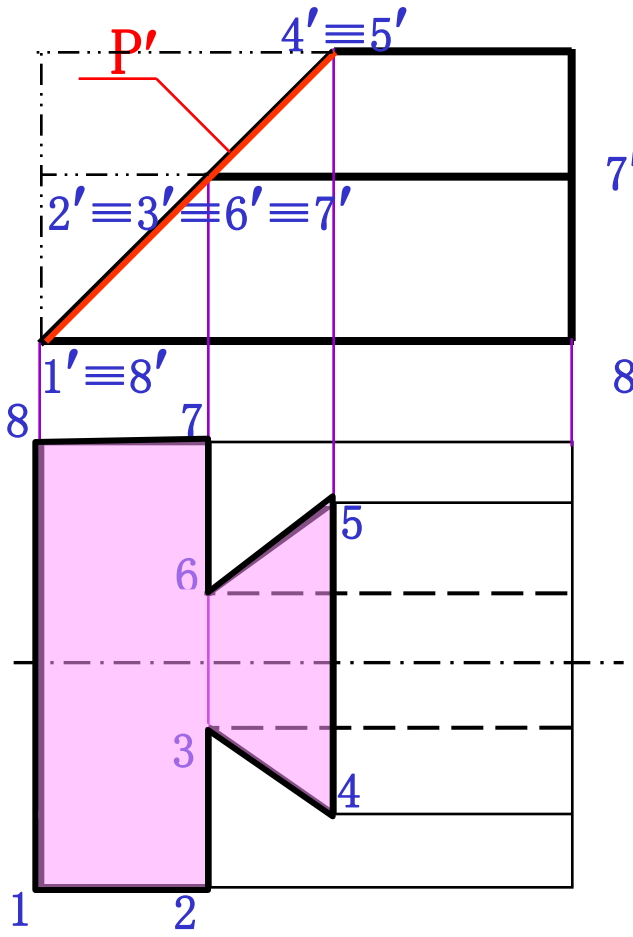
俯视中心线可保留

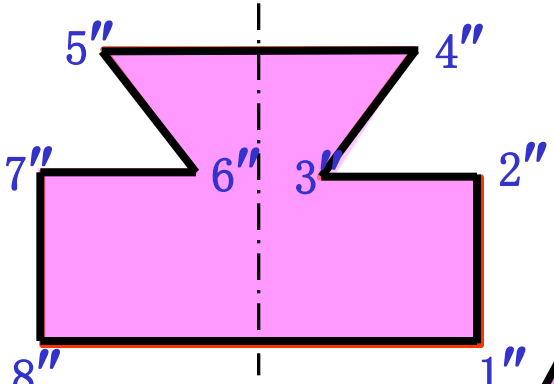
例：求正四棱锥被截切后的俯视图和左视图。

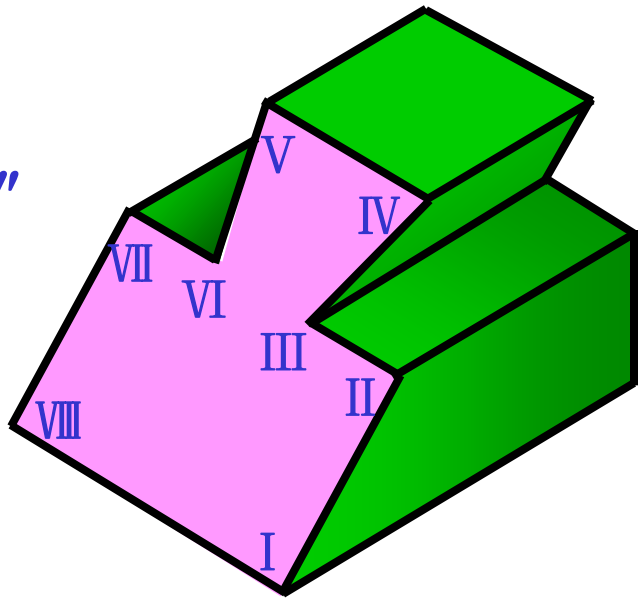


1. 空间分析
2. 投影分析
3. 作图
4. 检查（截断面、补全棱线）

例： 求棱柱被平面P截切后的俯视图。







1.空间分析

2.投影分析

3. 作出完整形体的第三投影

4. 定出多边形各个顶点的投影

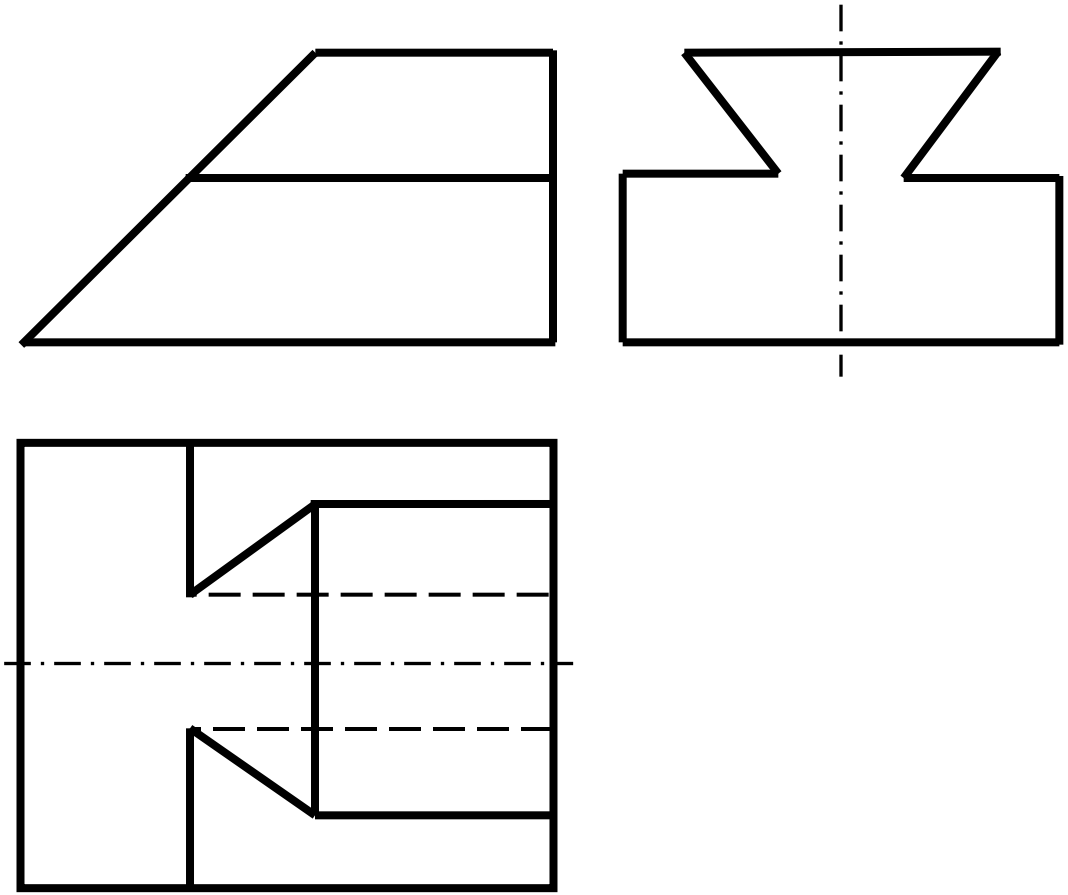
5. 作出斜面的其余投影

6. 检查面形

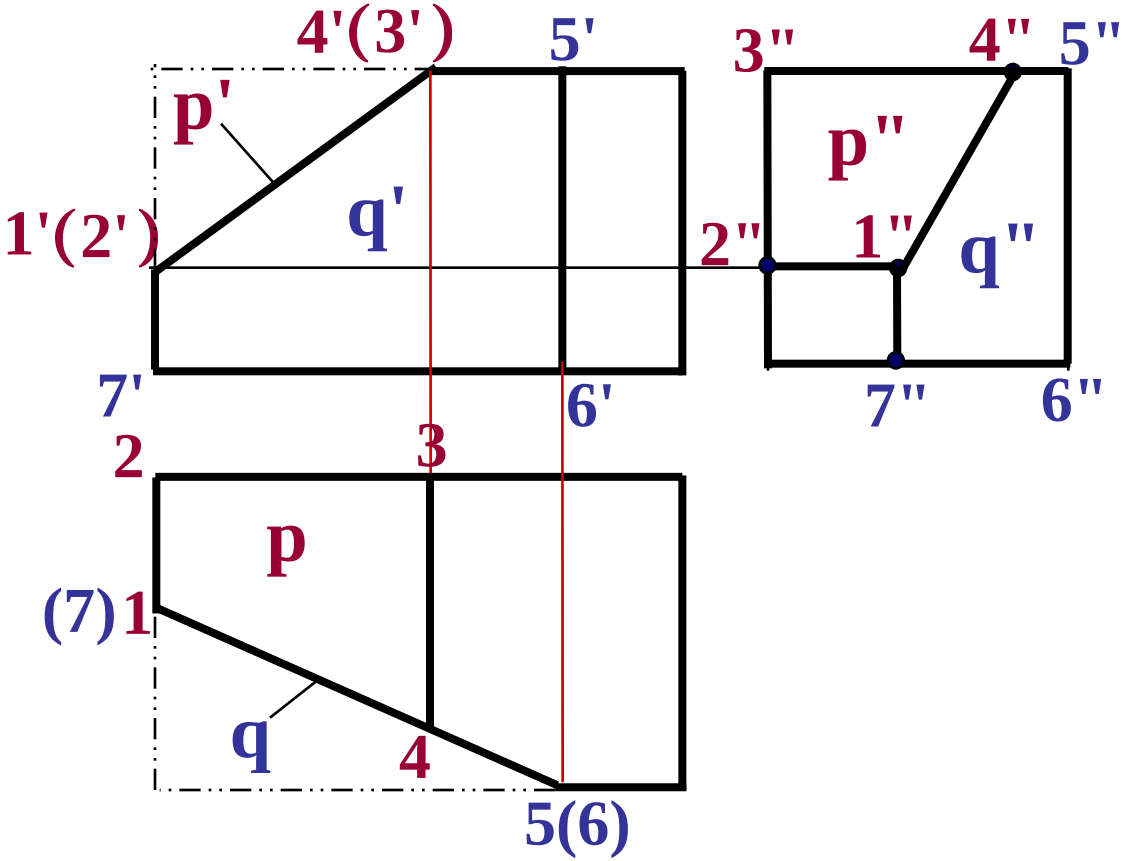
注意：

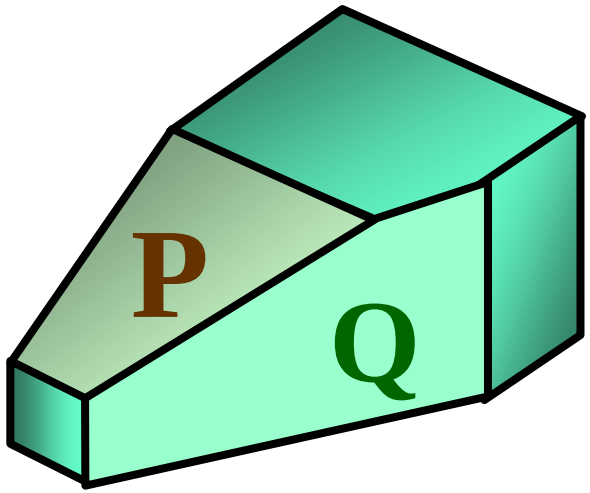
多边形顶点要顺序编号

例：求棱柱被平面P截切后的俯视图。



例：求左视图



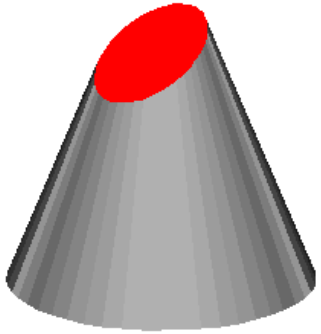


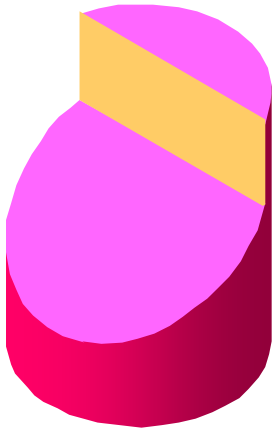
1. 空间分析
2. 投影分析
3. 作图
4. 检查：

   类似形

二、回转体的截切

截交线的特点：

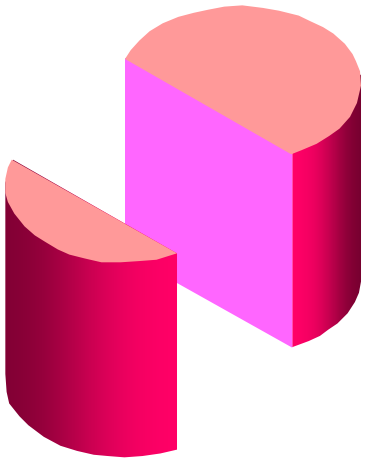




- 封闭的平面曲线组成
- 封闭的平面曲线和直线组成
- 封闭的平面多边形
- 公有性，截交线是截平面与回转体表面的共有点的连线

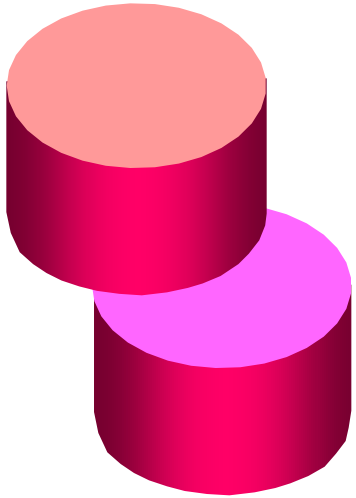
1. 圆柱体的截切

截平面与圆柱面截切产生的交线的形状取决于截平面与圆柱轴线的相对位置。



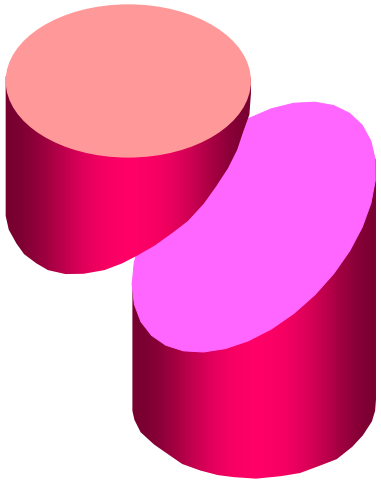
平行

两平行直线



垂直

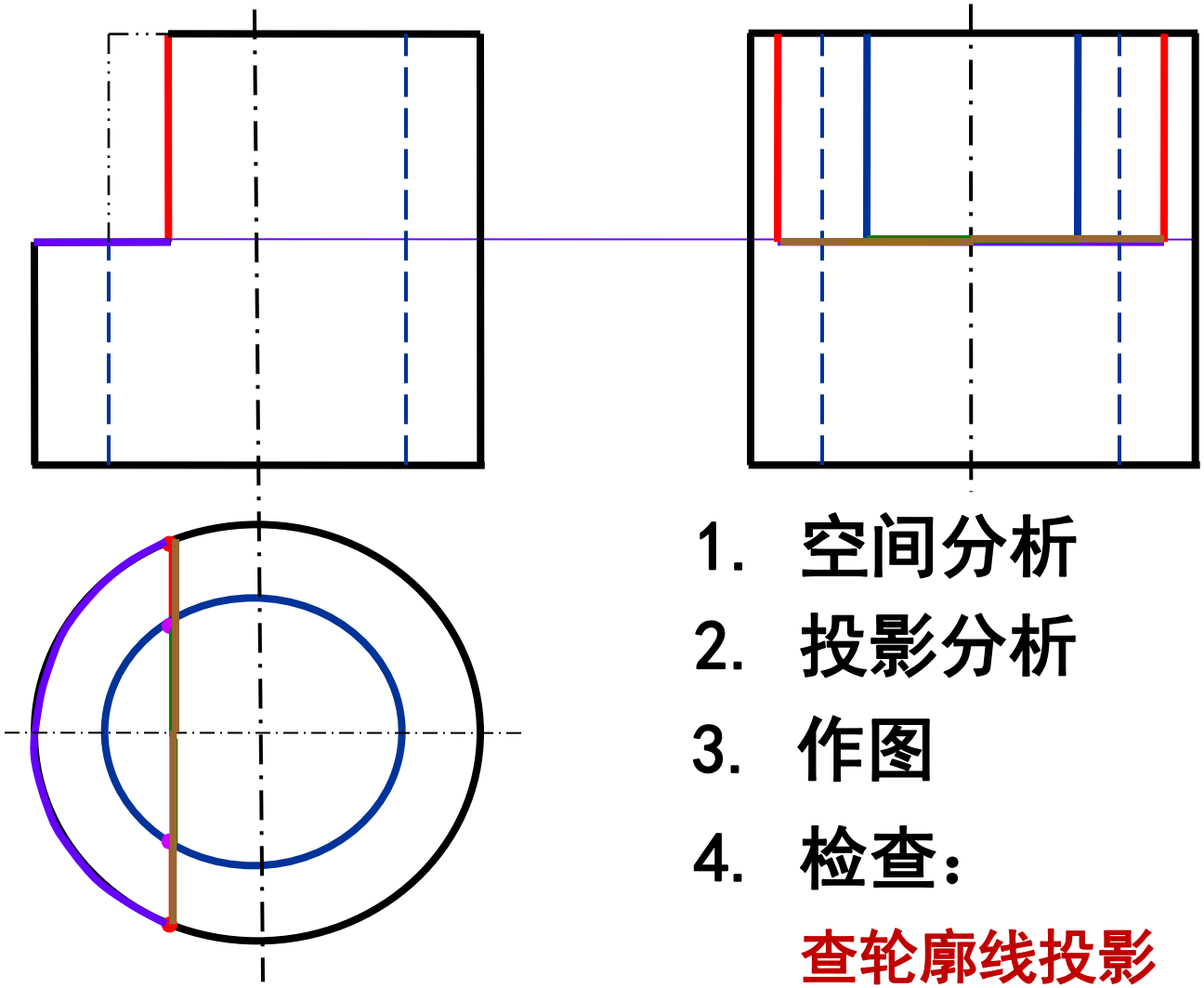
圆



倾斜

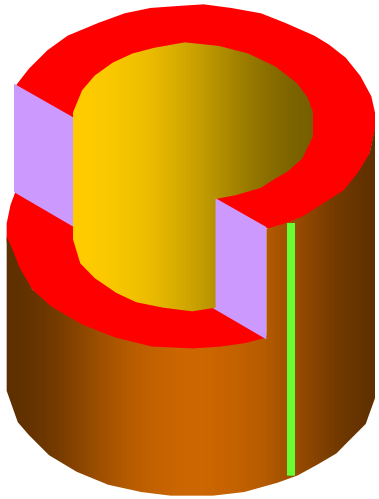
椭圆

例：求左视图

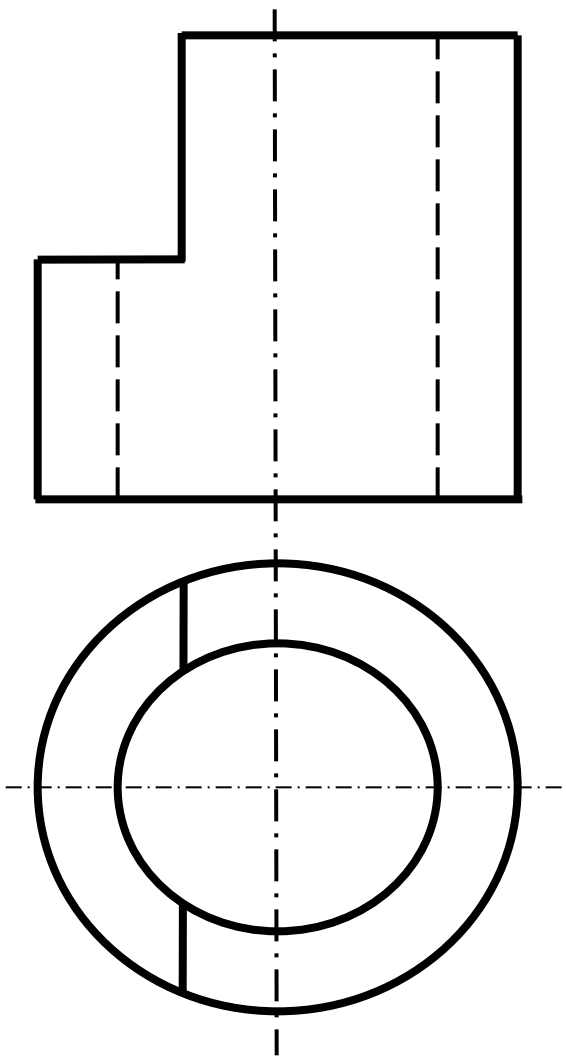


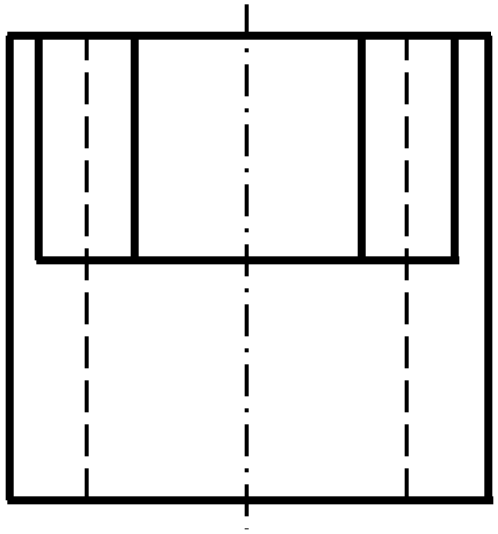
1. 空间分析
2. 投影分析
3. 作图
4. 检查：

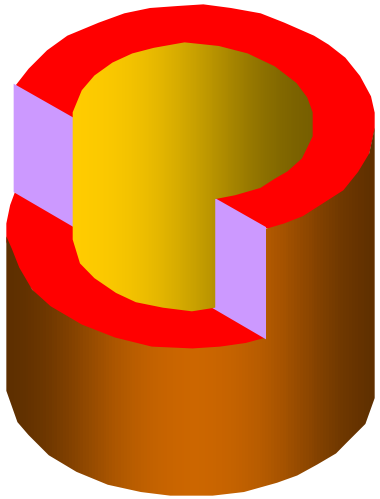
查轮廓线投影



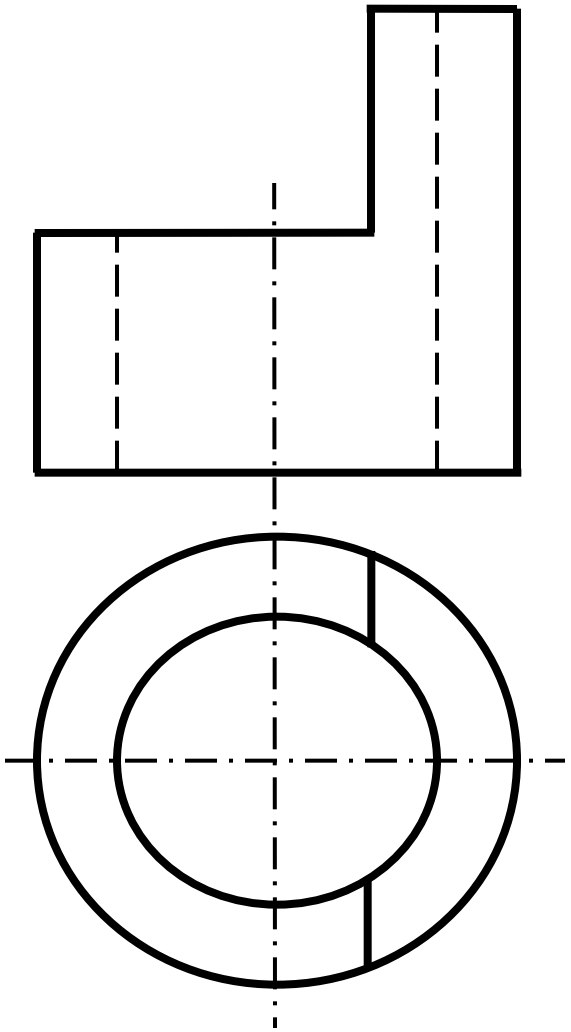
例：求左视图

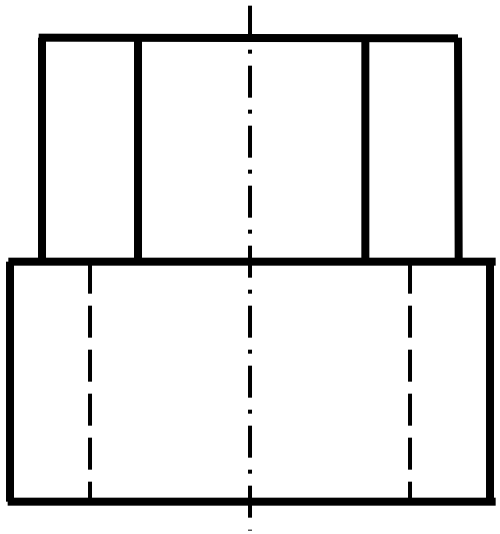


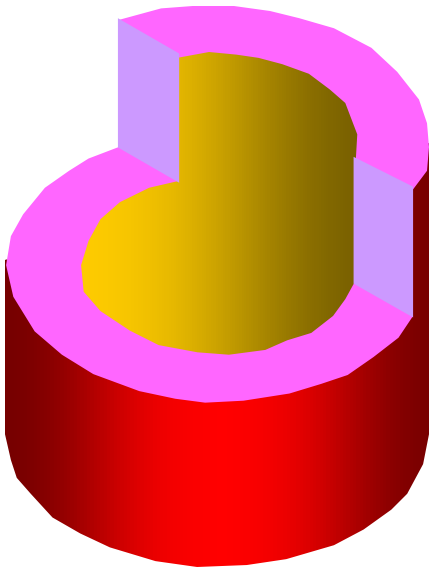




例：求左视图

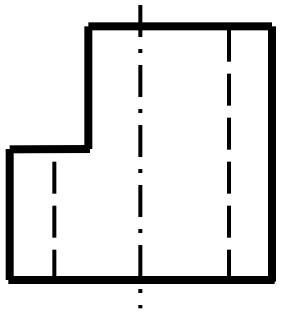


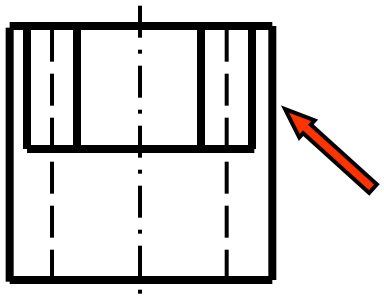


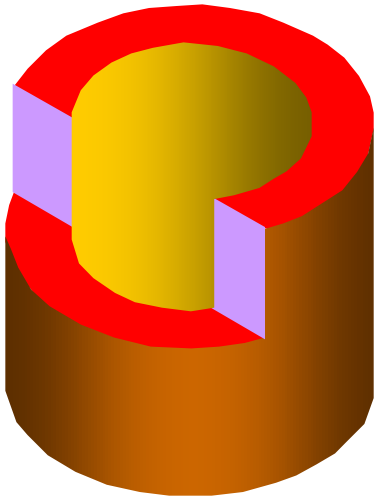


讨论：

单边截切范围不同时的比较

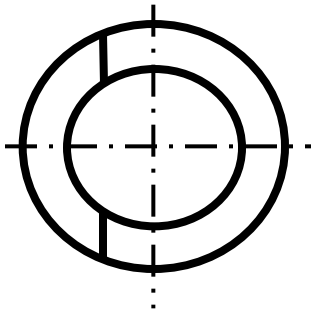




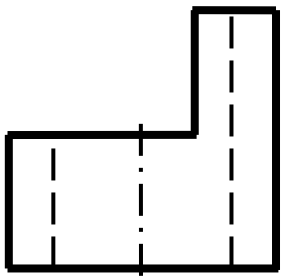


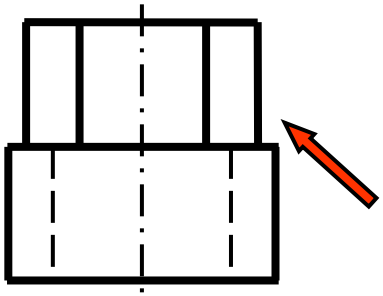
结论：

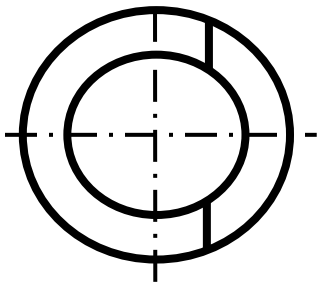
圆柱面轮廓线有差别

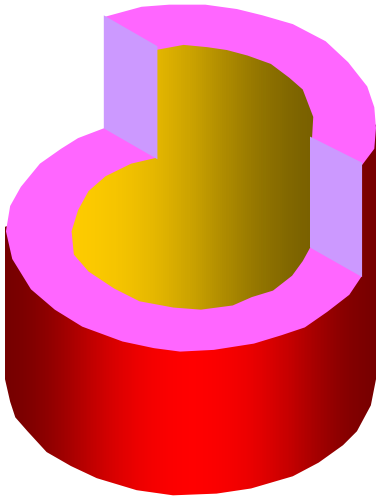


分析、比较



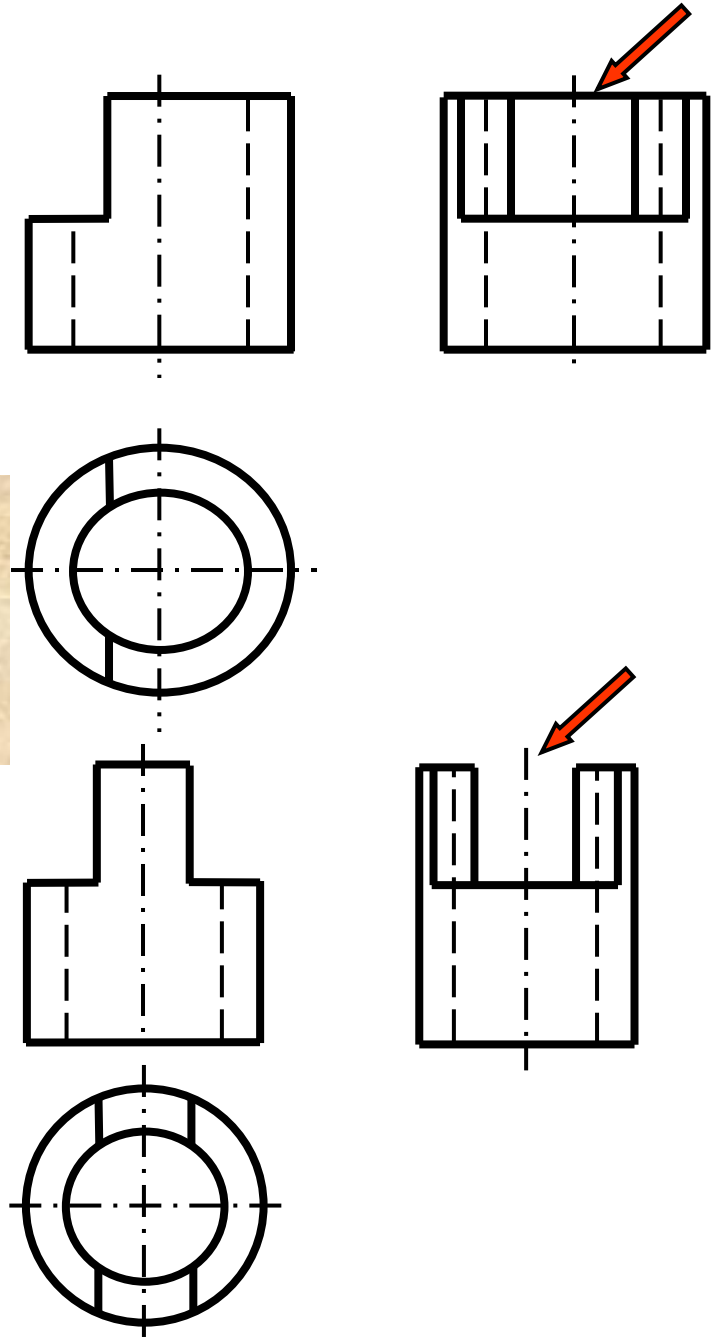


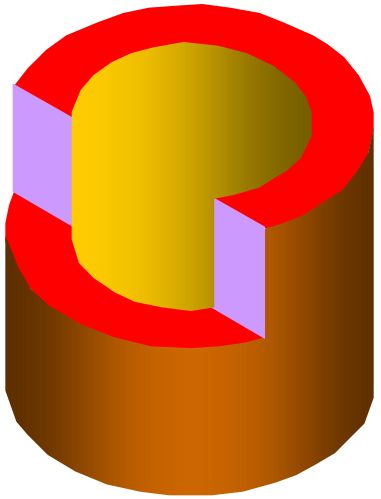




思考：

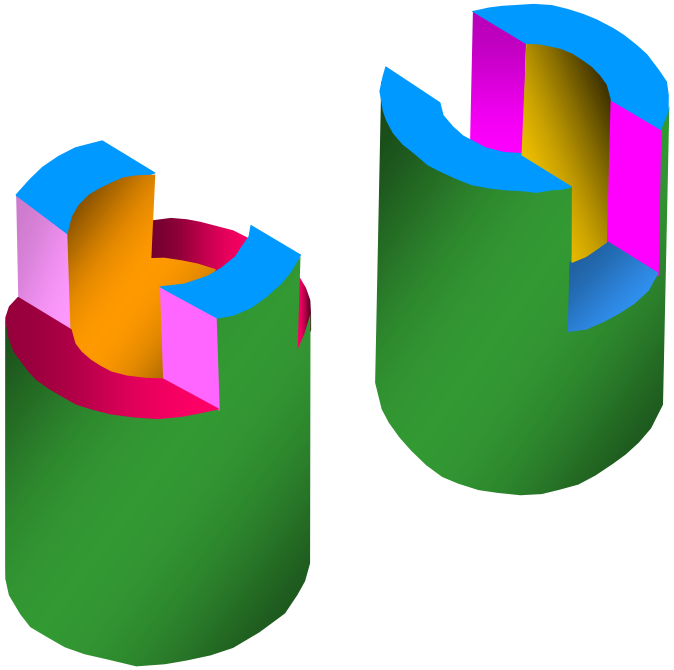
单边截切与双边截切的比较



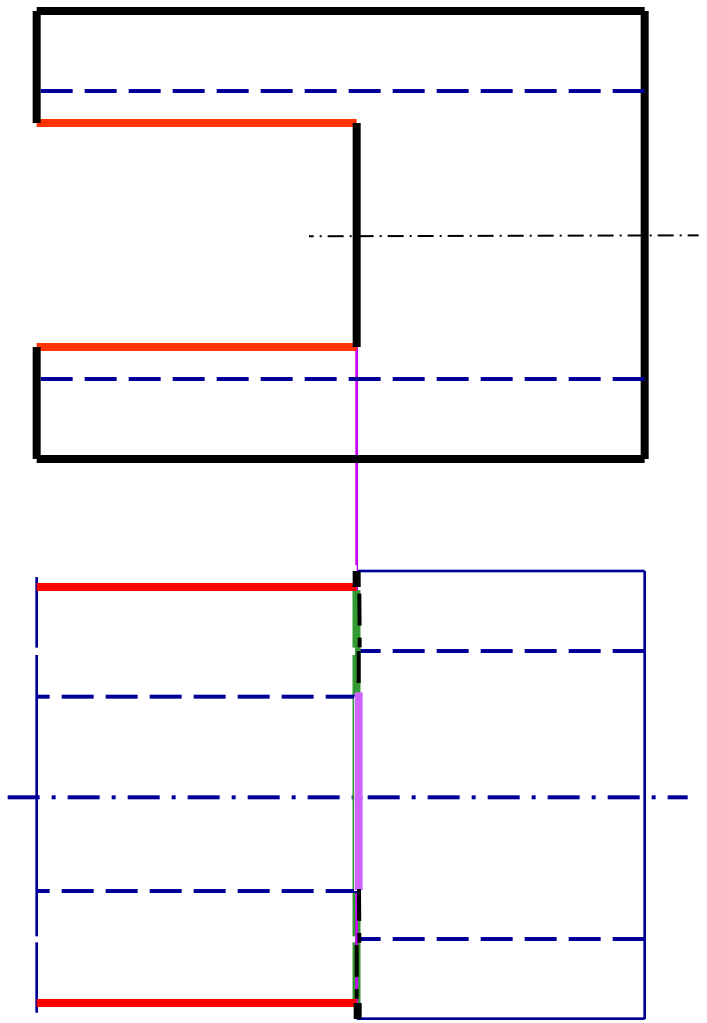


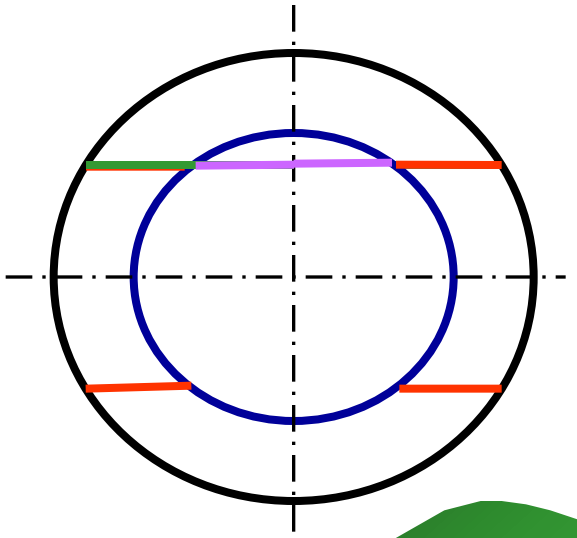
结论：

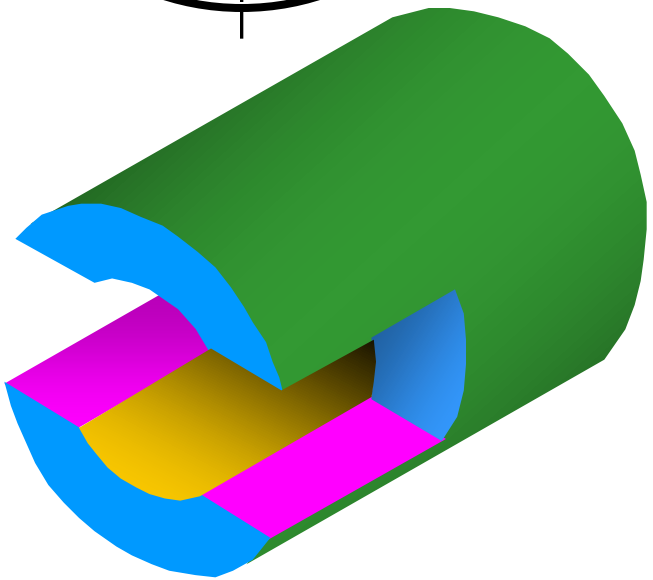
顶面投影有差别



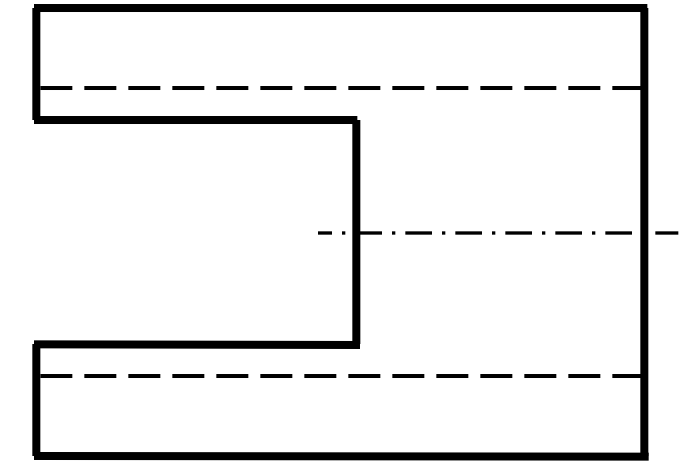
例：求俯视图

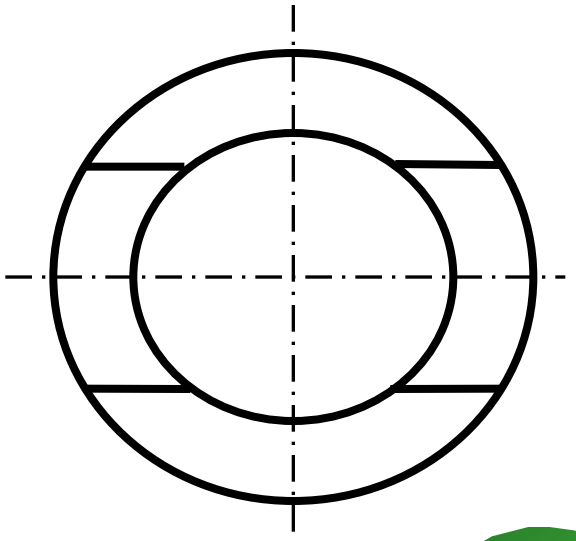


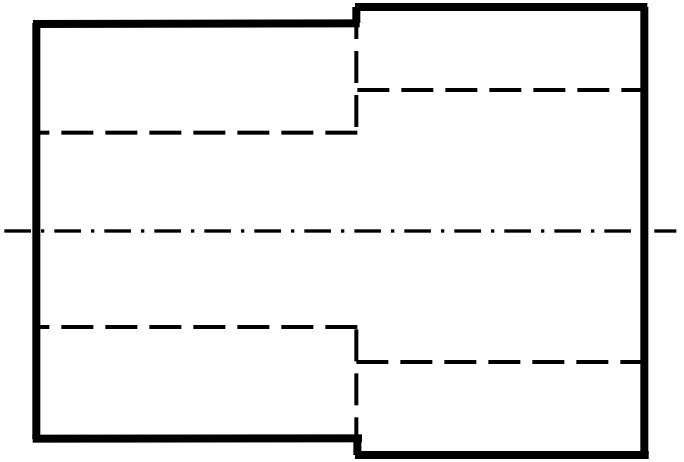


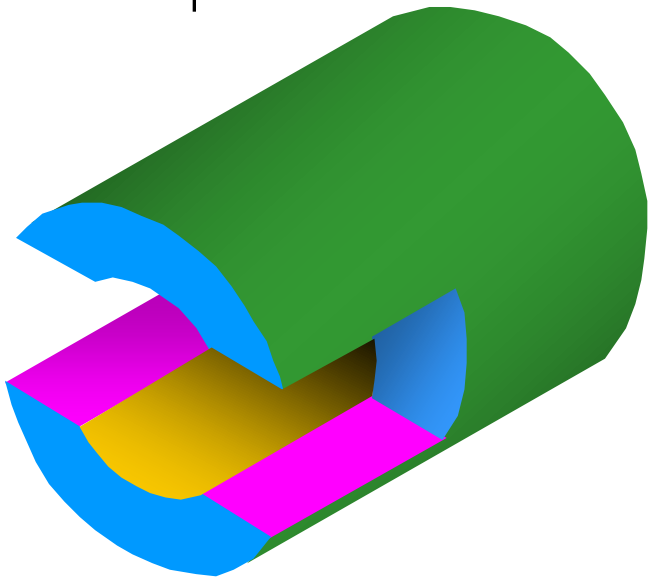


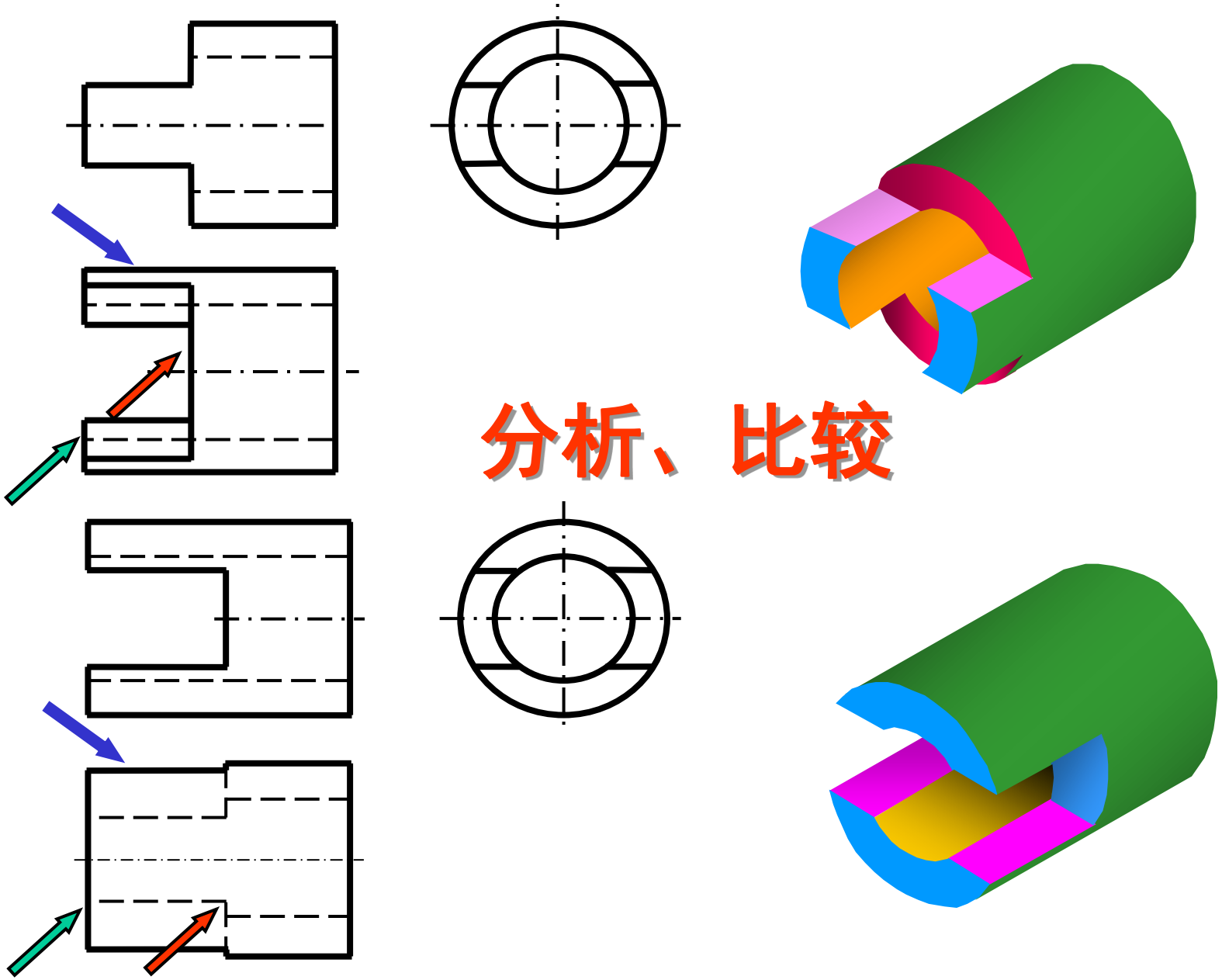
例：求俯视图





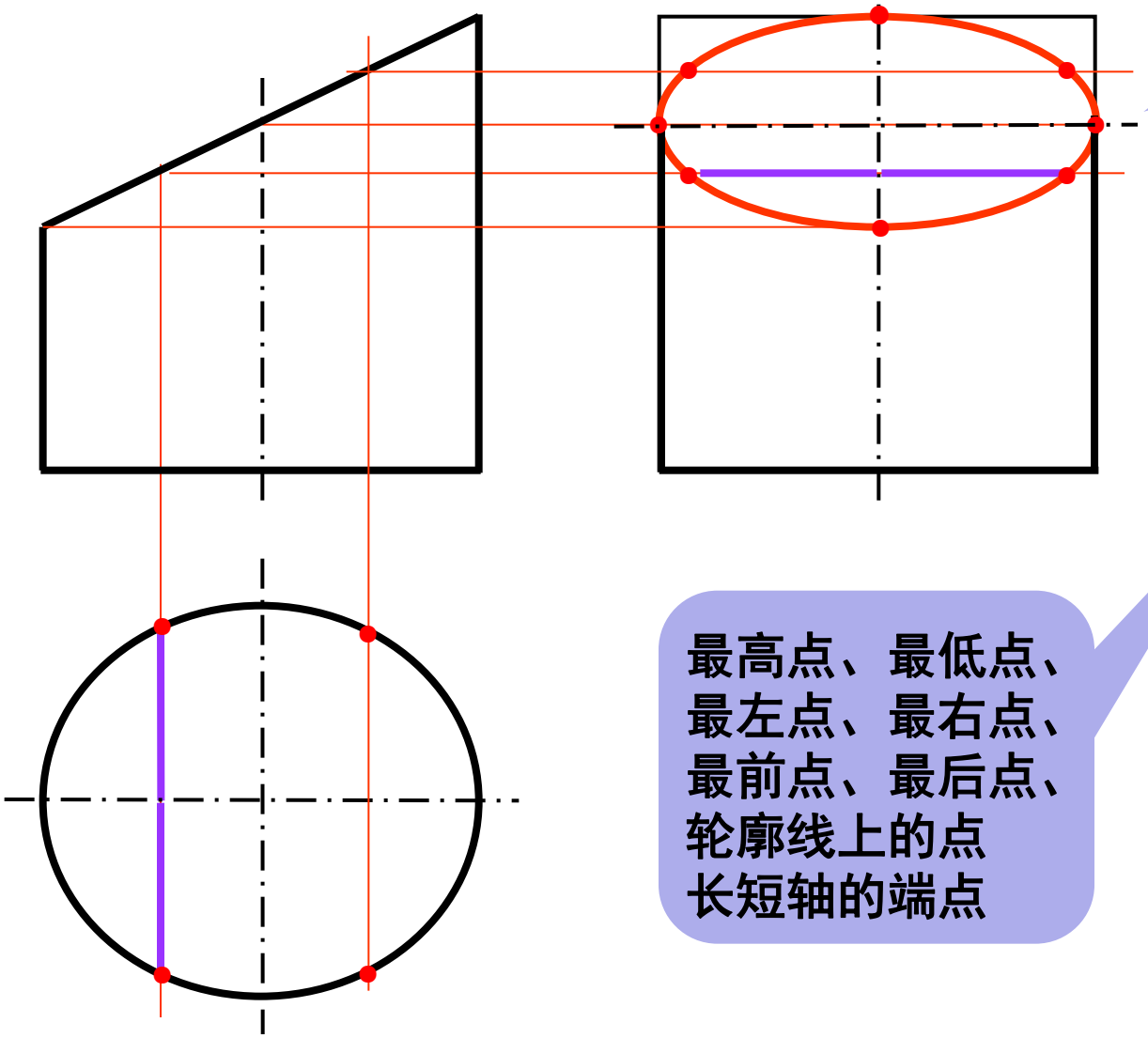





分析、比较

例：求左视图

求出回转体表面若干条素线与截平面的交点，然后连接而成。



椭圆长短轴

1. 空间分析
2. 投影分析
3. 画图

先作特殊点

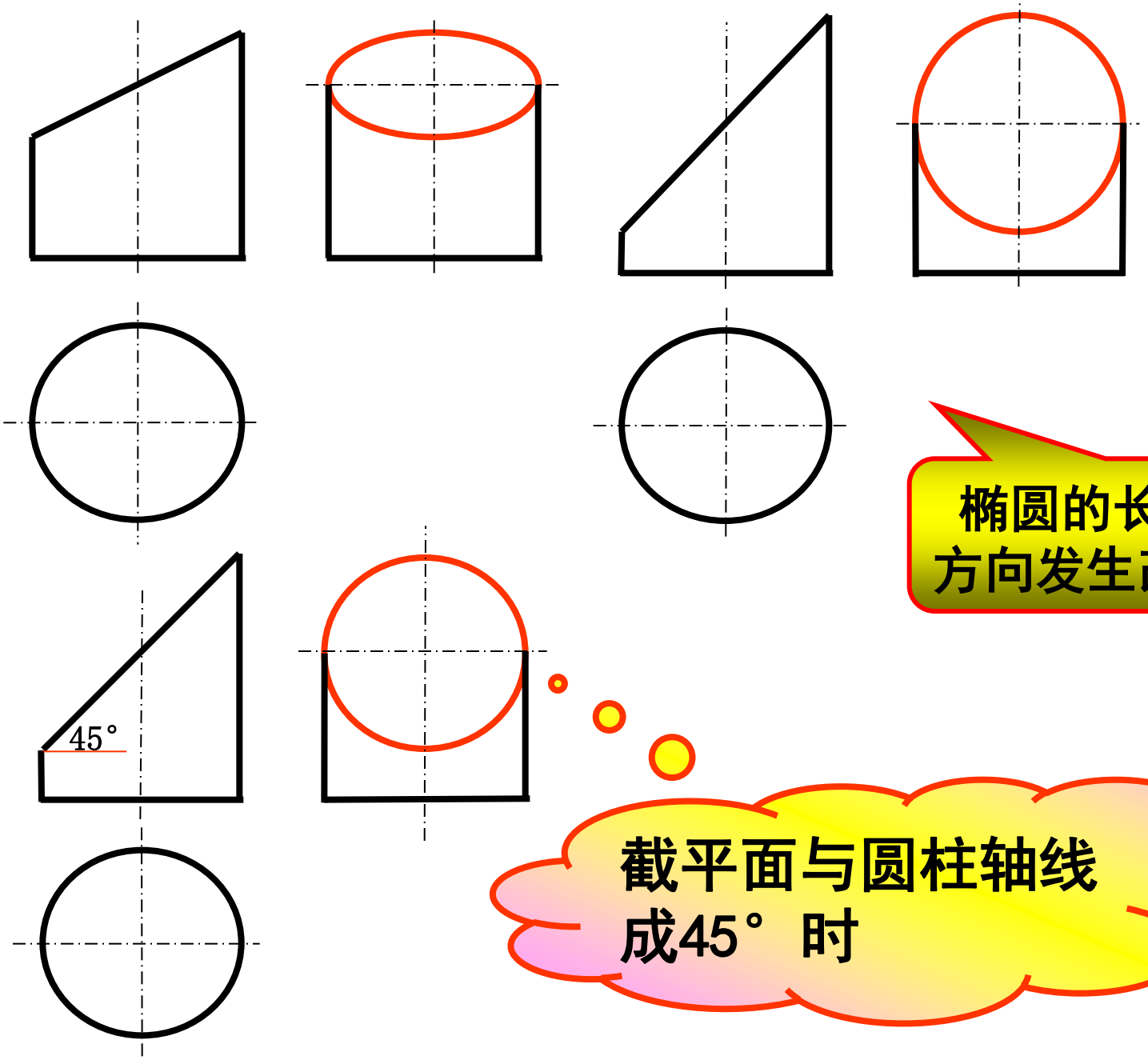
后作中间点

光滑连线

最高点、最低点、
最左点、最右点、
最前点、最后点、
轮廓线上的点
长短轴的端点

4. 检查

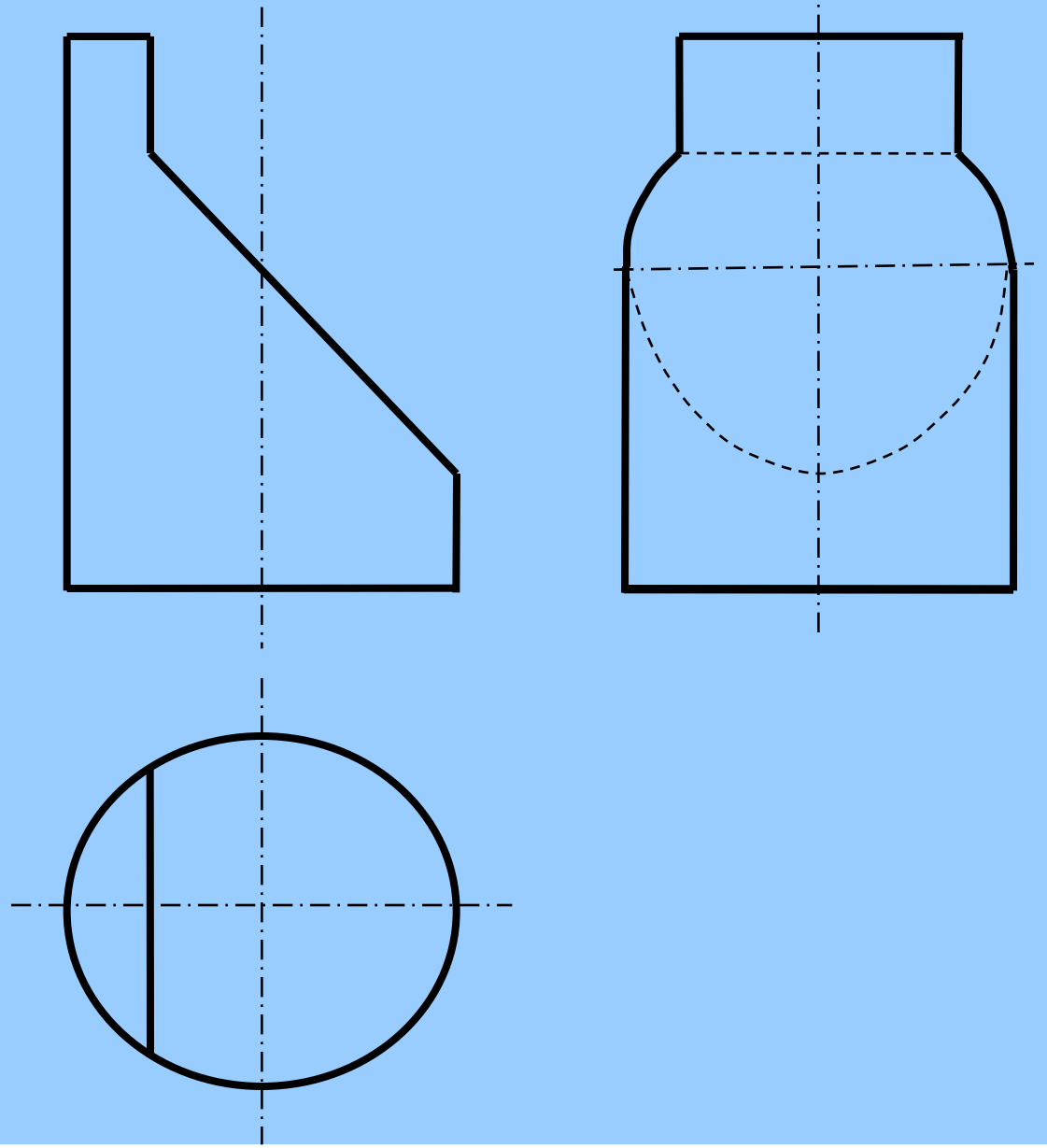
轮廓线投影



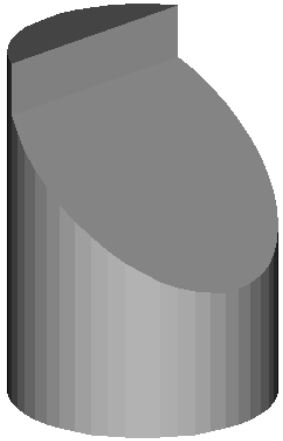
椭圆的长、短轴方向发生改变。

截平面与圆柱轴线成45°时

例：求左视图

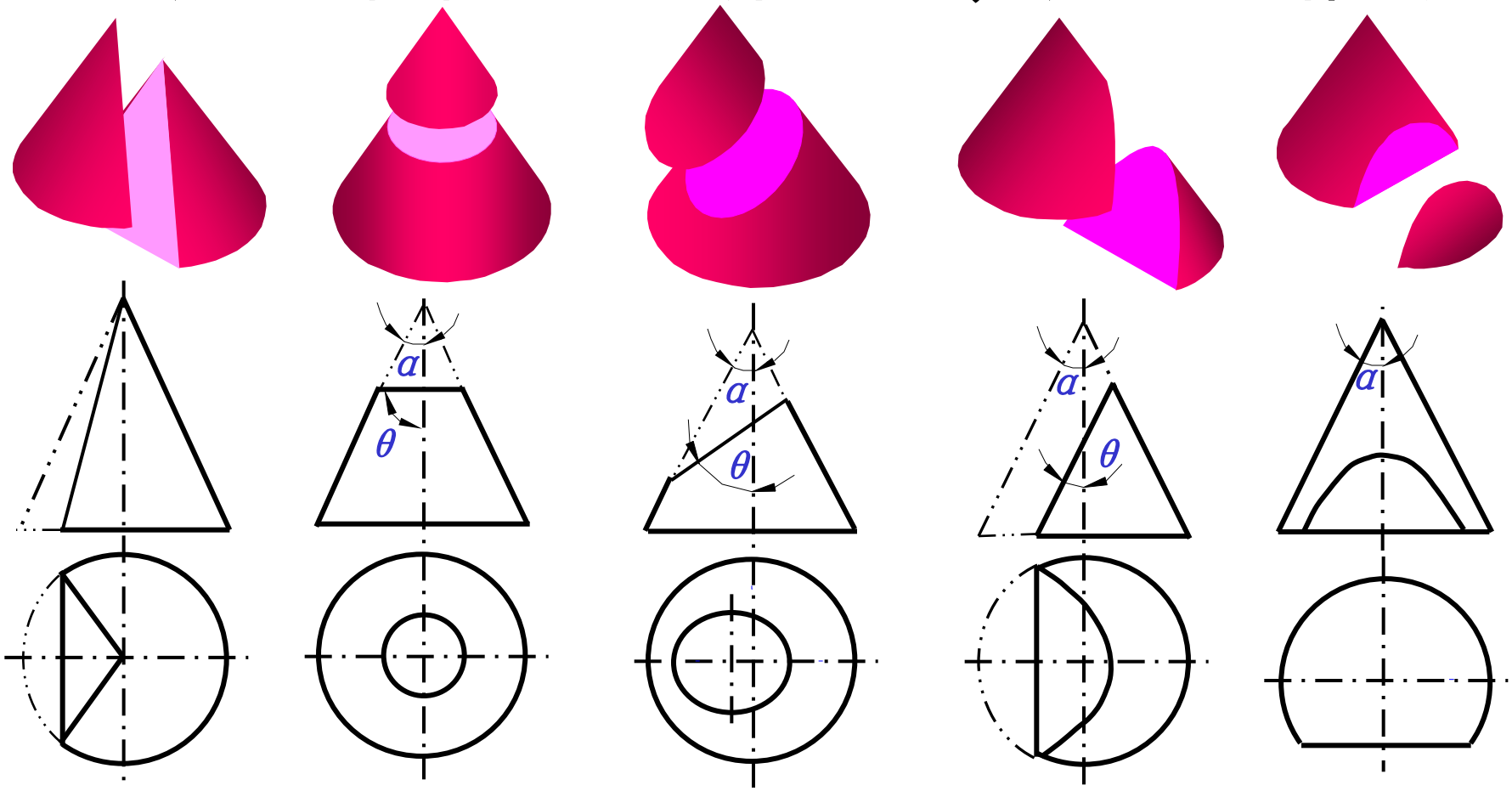


虚实分界点



2. 圆锥体的截切

根据截平面与圆锥轴线的相对位置不同，截交线有五种形状



过锥顶
两相交直线

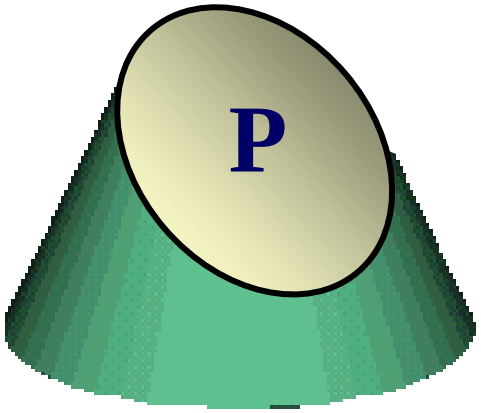
θ=90°
圆

90°＞θ＞α
椭圆

θ ＝ α
抛物线

0°≤ θ ＜ α
双曲线

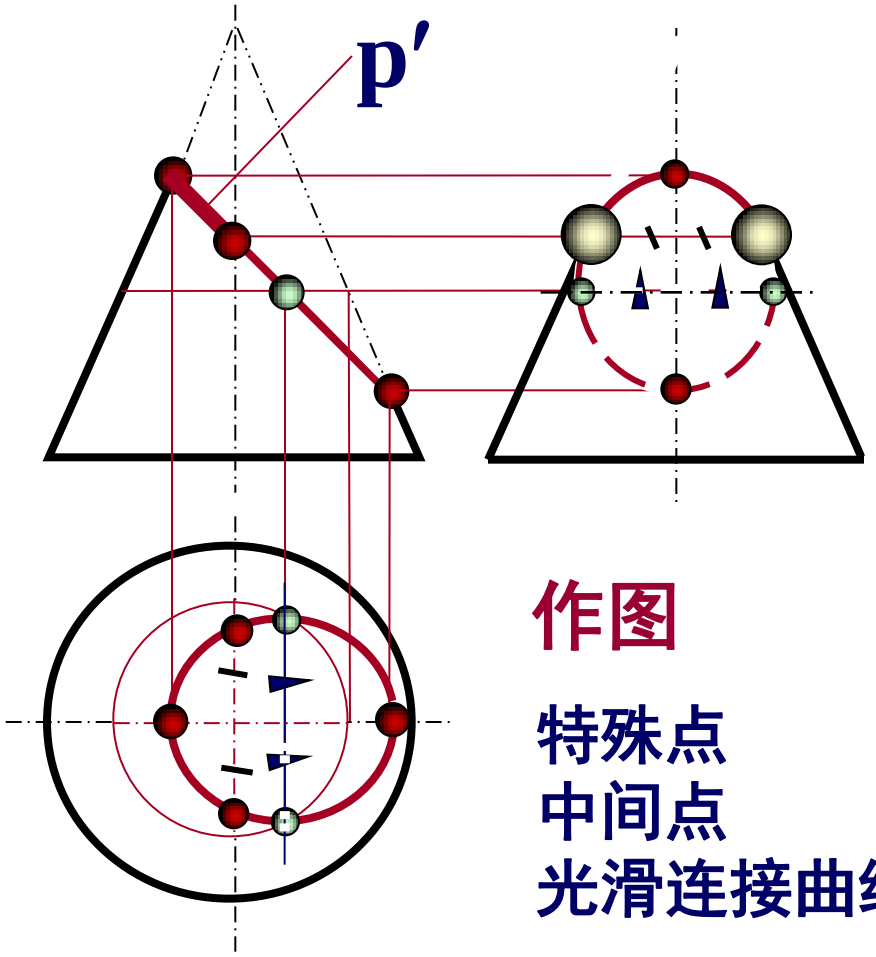
例 求截交线



空间分析

投影分析

检查



作图

特殊点

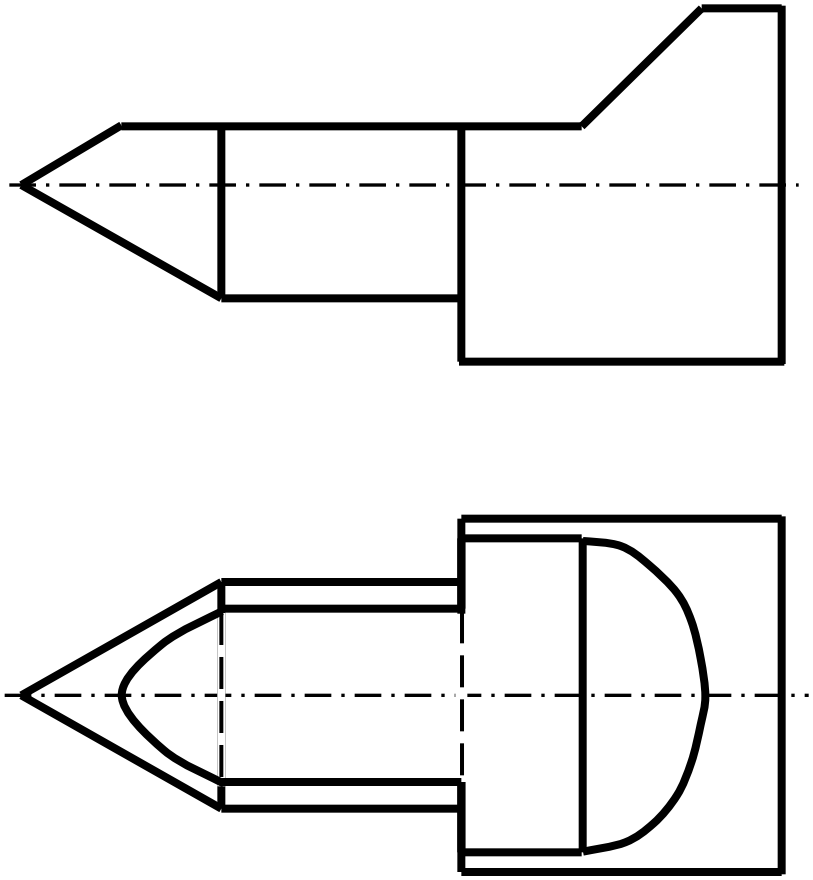
中间点

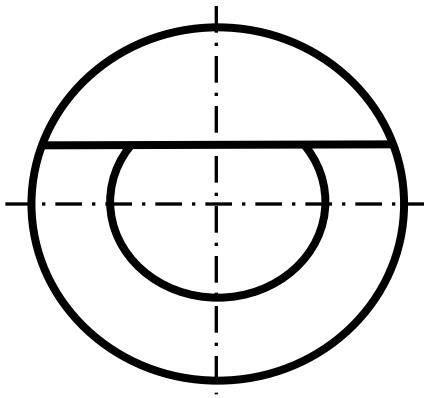
光滑连接曲线

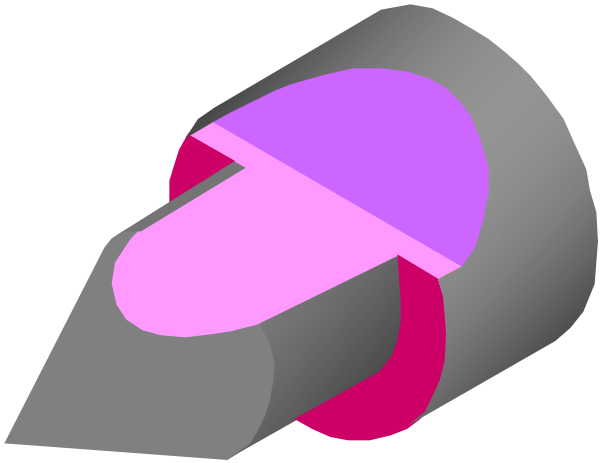
交线可见性

综合举例：

例：求作顶尖的俯视图







- 分析复合回转体由哪些基本回转体组成
- 分别求出截平面与每个基本体的交线
- 连接各交线求得截交线
- 检查截交线（截断面）和连接关系