

第二章 第三节

同名核线的确定与重采样



主要内容

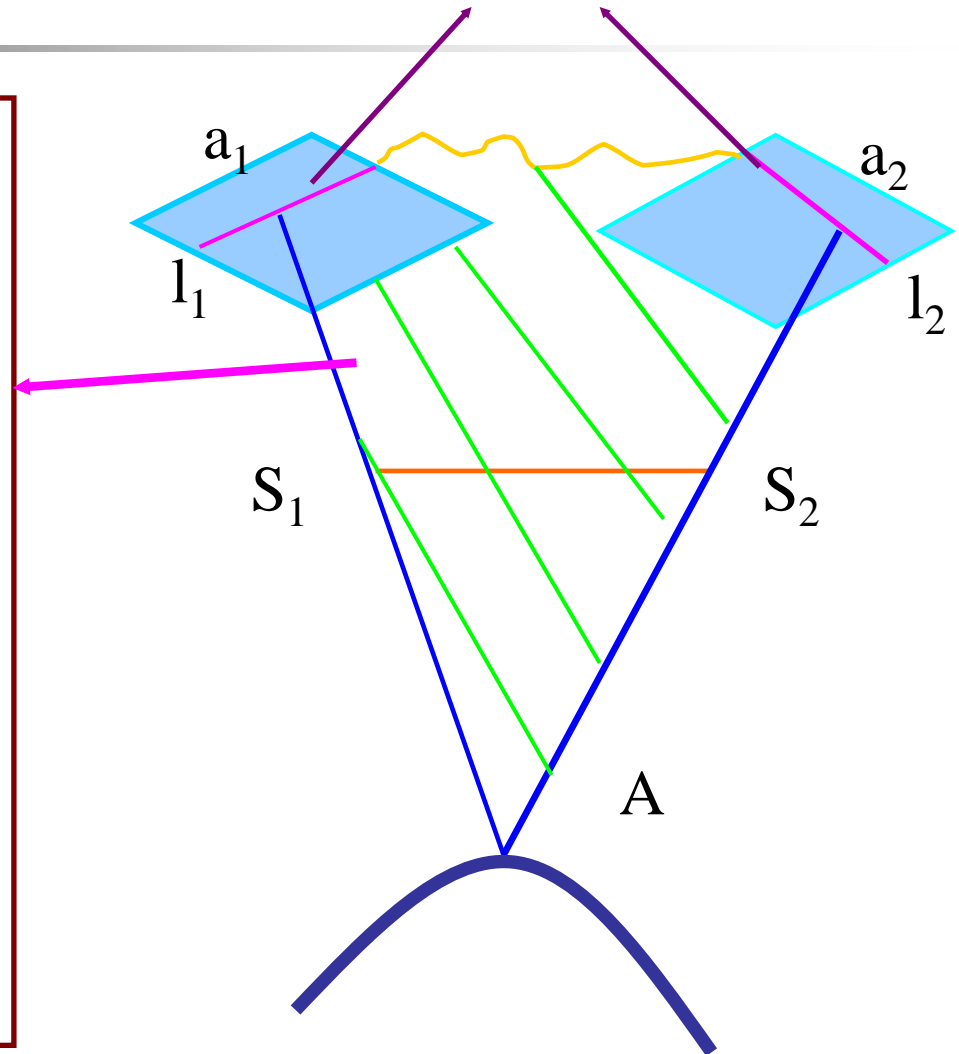
- 确定同名核线的两种方法
 - 基于影像几何纠正的核线解折关系
 - 基于共面条件的同名核线几何关系
- 核线的重排列（重采样）

同名核线

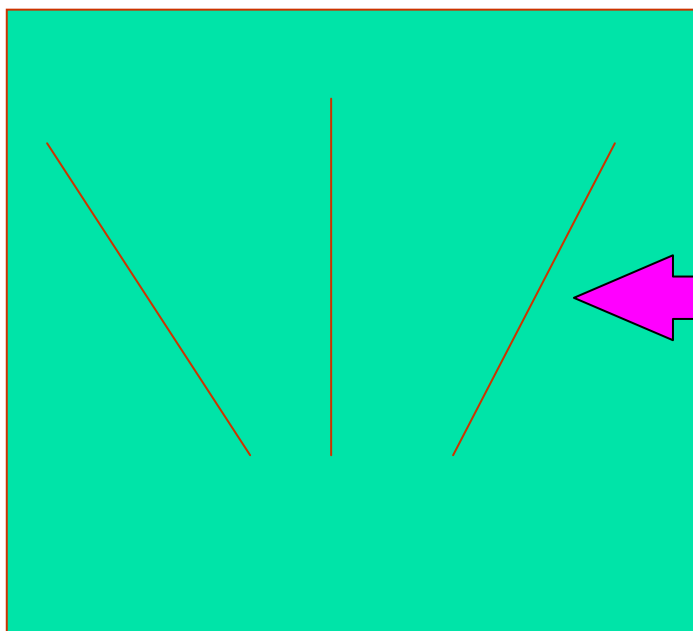
通过摄影基线与地面所作的平面称为核面

核面与影像面交线称为核线

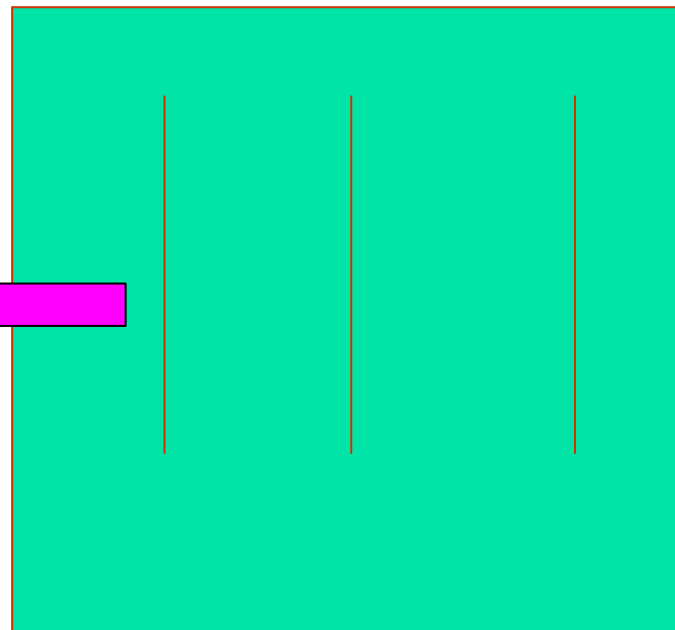
同名像点必定在同名核线上



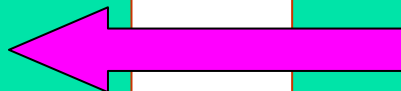
一.基于影像几何纠正的核线解折关系



倾斜影像



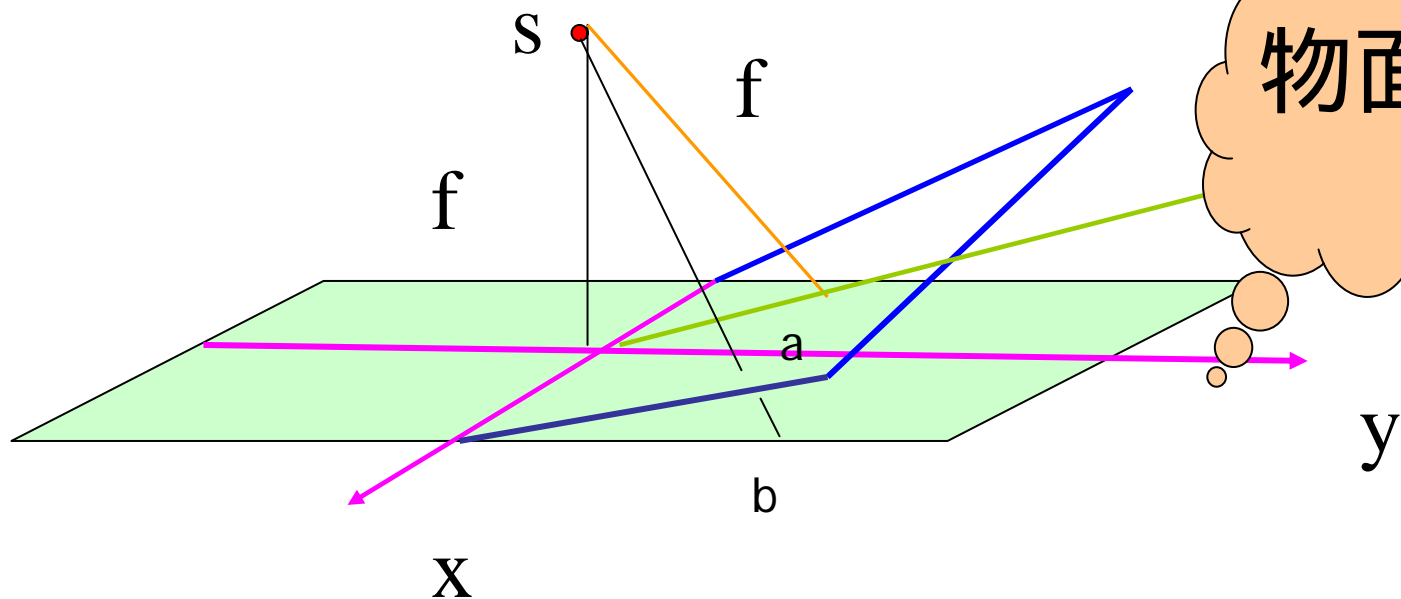
水平影像



1. 水平像片与倾斜像片的坐标关系

y

$$x - x_0 = -f \frac{a_1(X - X_s) + b_1(Y - Y_s) + c_1(Z - Z_s)}{a_3(X - X_s) + b_3(Y - Y_s) + c_3(Z - Z_s)}$$
$$y - y_0 = -f \frac{a_2(X - X_s) + b_2(Y - Y_s) + c_2(Z - Z_s)}{a_3(X - X_s) + b_3(Y - Y_s) + c_3(Z - Z_s)}$$



示意图

摄影基线

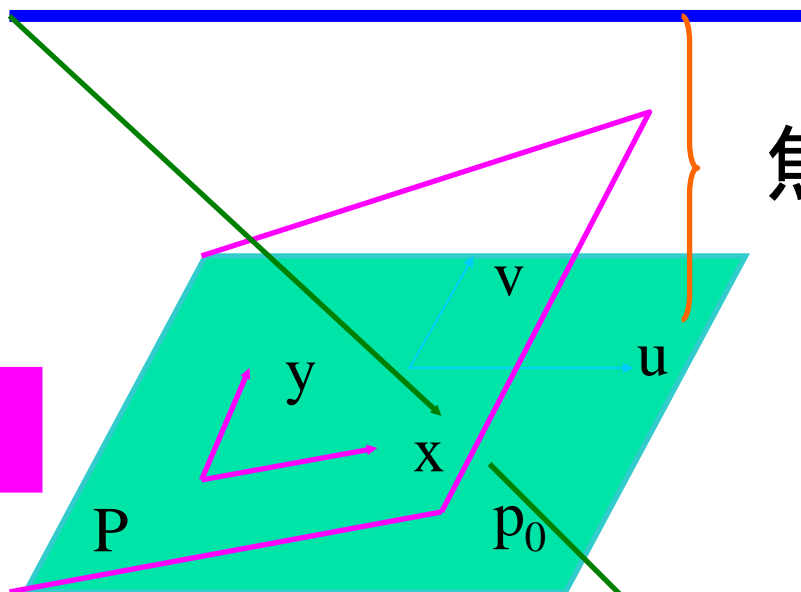
S_1

S_2

焦距 f

倾斜影像

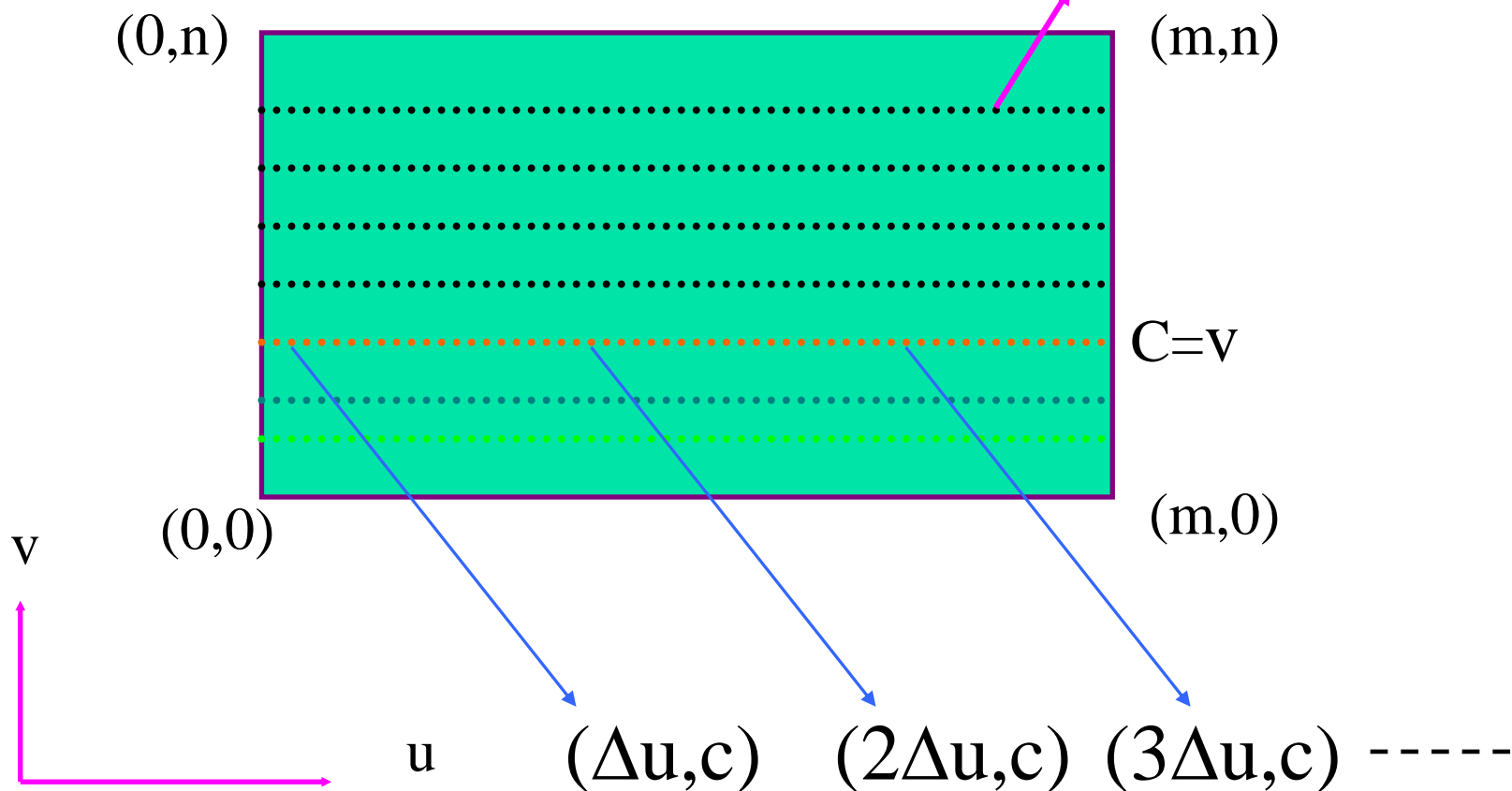
水平相片



$$x = -f \cdot \frac{a_1 u + b_1 v - c_1 f}{a_3 u + b_3 v - c_3 f}$$
$$y = -f \cdot \frac{a_2 u + b_2 v - c_2 f}{a_3 u + b_3 v - c_3 f}$$

2.在“水平”影像上获取核线影像

$v =$ 某常数即表示某一核线



$(\Delta u, c)$ $(2\Delta u, c)$ $(3\Delta u, c)$ -----

$$x = -f \cdot \frac{a_1 u + b_1 v - c_1 f}{a_3 u + b_3 v - c_3 f}$$
$$y = -f \cdot \frac{a_2 u + b_2 v - c_2 f}{a_3 u + b_3 v - c_3 f}$$

(x_1, y_1)

(x_2, y_2)

(x_3, y_3)

$$u = k_1 \Delta \quad v = k_2 \Delta$$

采样间隔

3.核线的重排列（重采样）

是否是采样点？

$$g_0(k\Delta, c) = g(x_0, y_0)$$

$$g_0((k+1)\Delta, c) = g(x_1, y_1)$$

水平相片

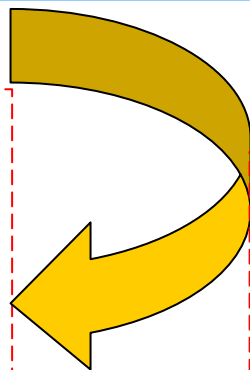
倾斜相片

4.同名核线的确定

同名核线的 v 坐标值相等

$$\begin{aligned}x' &= -f \cdot \frac{a_1' u' + b_1' v' - c_1' f}{a_3' u' + b_3' v' - c_3' f} \\y' &= -f \cdot \frac{a_2' u' + b_2' v' - c_2' f}{a_3' u' + b_3' v' - c_3' f}\end{aligned}$$

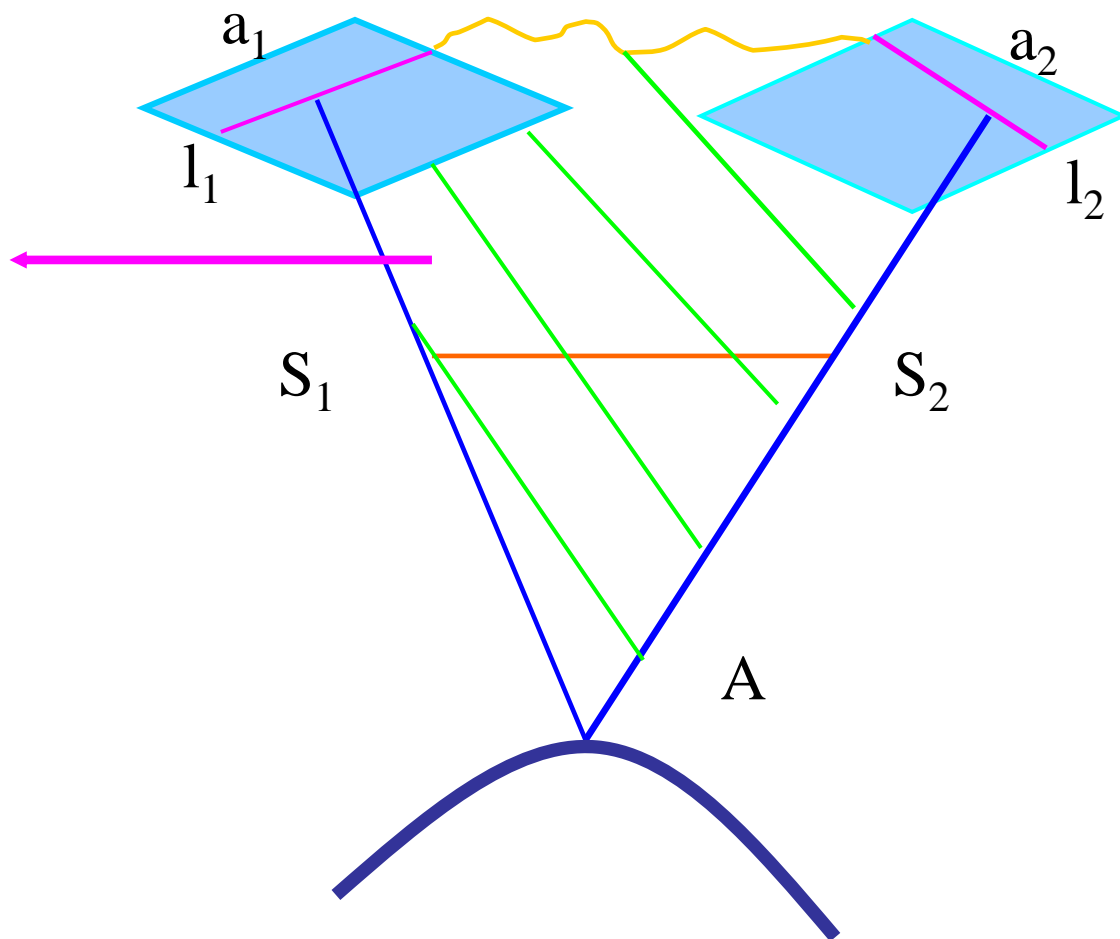
$$\begin{aligned}x' &= \frac{d_1' u' + d_2'}{d_3' u' + 1} \\y' &= \frac{e_1' u' + e_2'}{e_3' u' + 1}\end{aligned}$$



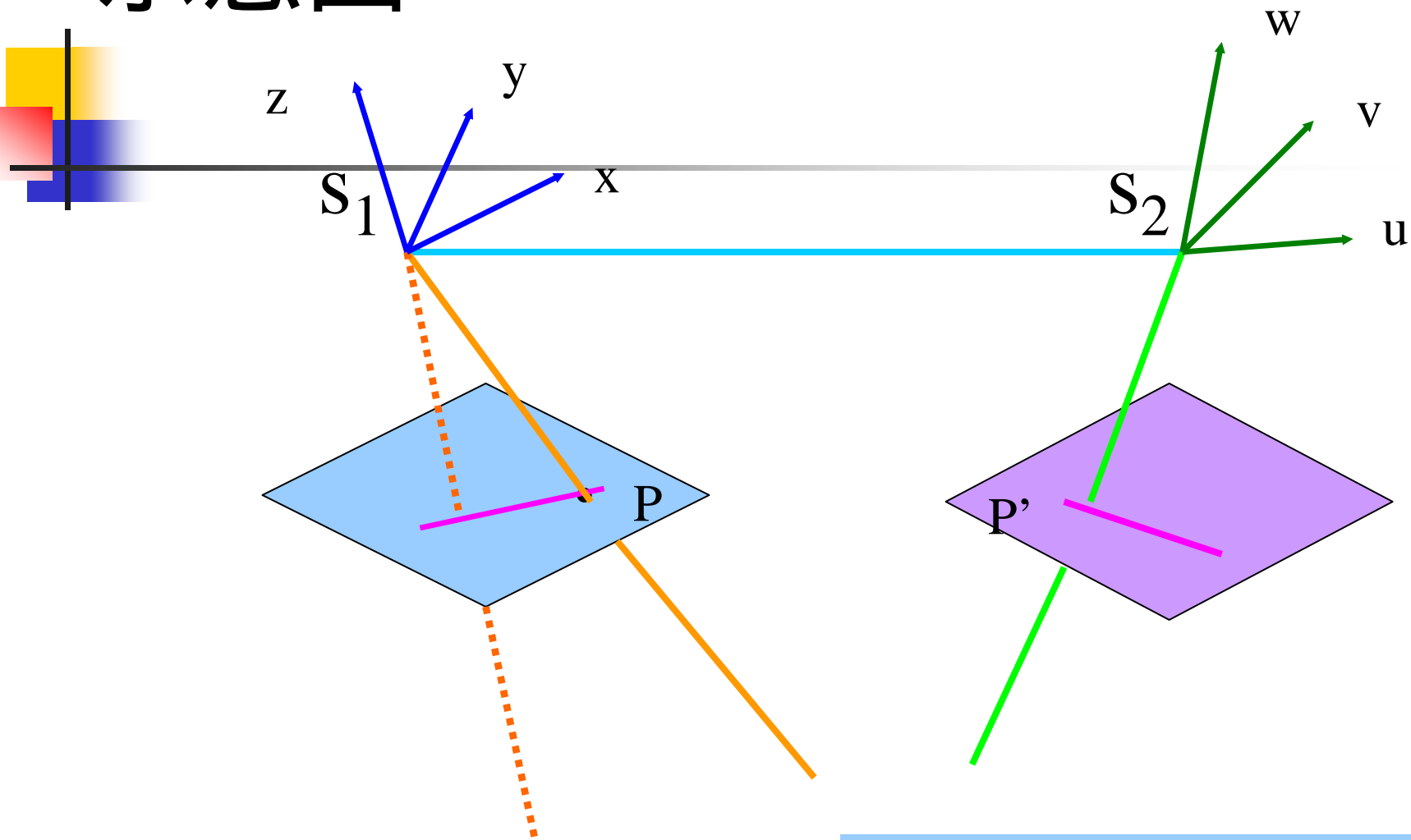
$$\begin{aligned}g_0'(k\Delta, c) &= g'(x_0, y_0) \\g_0'((k+1)\Delta, c) &= g'(x_1, y_1)\end{aligned}$$

二.基于共面条件的同名核线几何关系

直接
在斜
像上
获取
核线
影像



示意图



$$\vec{B} \cdot (\vec{S}_p \times \vec{S}_q) = 0$$

$$\vec{B} \cdot (\vec{S}_p \times \vec{S}_{p'}) = 0$$

1.左核线的确定

$$\vec{B} \cdot (\vec{S}_p \times \vec{S}_q) = 0$$

$$\begin{vmatrix} B_X & B_Y & B_Z \\ x_p & y_p & -f \\ x & y & -f \end{vmatrix} = 0$$

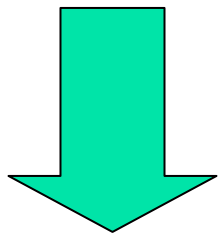
$$\begin{aligned} A &= f \cdot B_Y + y_p \cdot B_Z \\ B &= f \cdot B_X + x_p \cdot B_Z \\ C &= y_p \cdot B_X - x_p \cdot B_Y \end{aligned}$$

$$y = (A/B)x + (C/B)f$$

左核线
的直线
方程

2. 右核线的确定

$$\begin{vmatrix} -u'_s & -v'_s & -w'_s \\ u'_p & v'_p & -w'_p \\ u' & v' & -f \end{vmatrix} = 0$$



$$v' = (A' / B')u' + (C' / B')f$$

右核线的直线方程

3. 参数的确定

$$A' = v'_p w'_s - w'_p v'_s$$

$$B' = u'_p w'_s - w'_p u'_s$$

$$C' = v'_p w'_s - u'_p v'_s$$

$$\begin{bmatrix} u'_p & v'_p & w'_p \end{bmatrix} = \begin{bmatrix} x_p & y_p & -f \end{bmatrix} M_{21}$$

$$\begin{bmatrix} u'_s & v'_s & w'_s \end{bmatrix} = \begin{bmatrix} B_X & B_Y & B_Z \end{bmatrix} M_{21}$$

4. 单独像对相对定向

$$\begin{vmatrix} B_X & B_Y & B_Z \\ x_p & y_p & -f \\ x & y & -f \end{vmatrix} = 0$$

$$B_Y = B_Z = 0$$

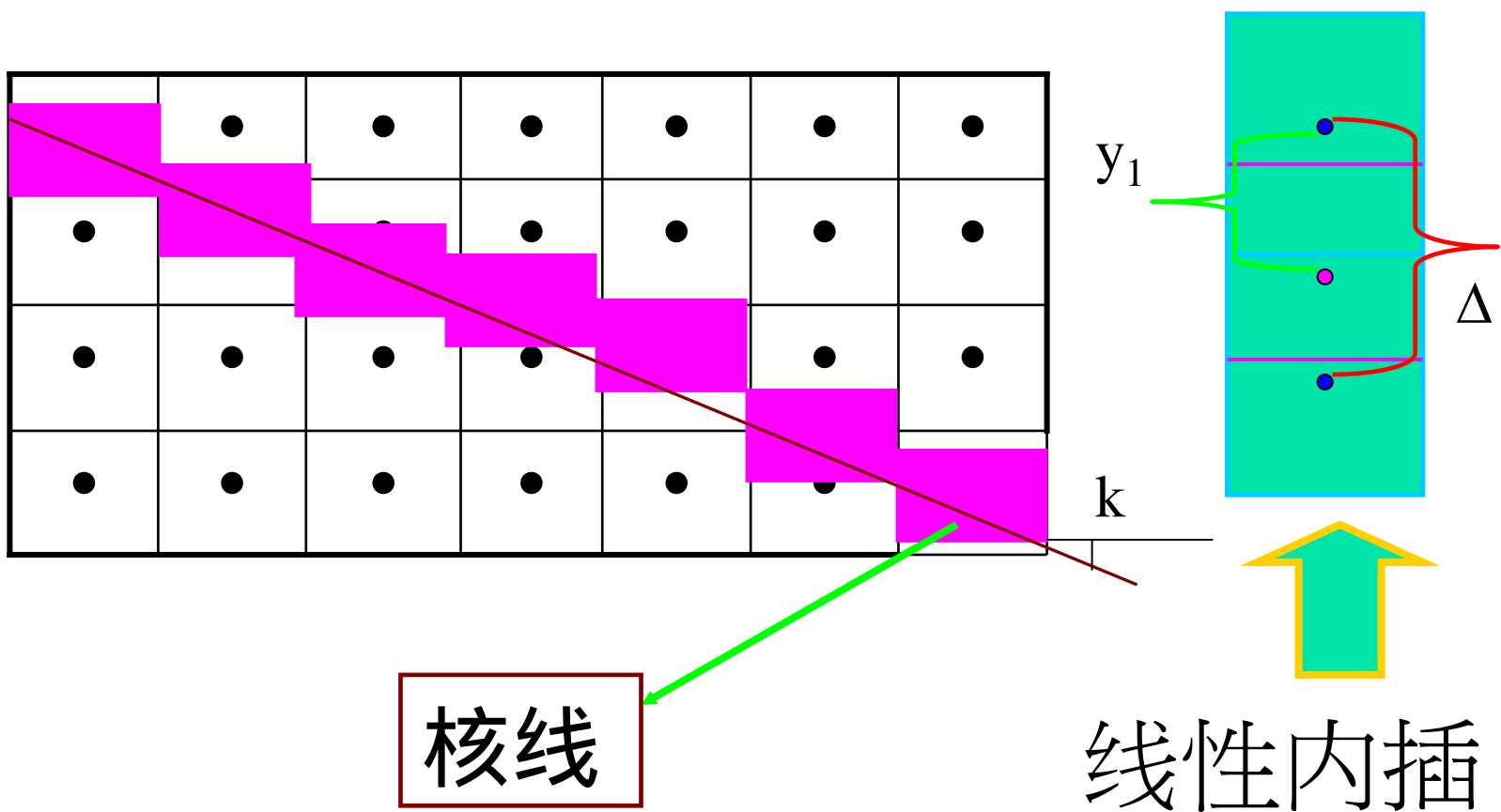
$$\begin{vmatrix} v_p & w_p \\ v & w \end{vmatrix} = 0$$

$$v = b_1 x + b_2 y - b_3 f$$
$$w = c_1 x + c_2 y - c_3 f$$

$$y = (A/B)x + (C/B)f$$

$$A = v_p c_1 - w_p b_1$$
$$B = w_p b_2 - v_p c_2$$
$$C = w_p b_3 - v_p c_3$$

线性内插示意图



5.核线的重排列（重采样）

- 线性内差

$$d = \frac{1}{\Delta} [(\Delta - y_1)d_1 + y_1d_2]$$

- 最邻近法

$$n = 1 / \text{tg}K$$

对每条核线
而言 K 是常数