

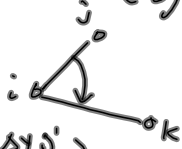
Lecture 18 $\theta_{ijk} = \alpha_{ik} - \alpha_{ij}$ 18-1

$$\theta_{ijk} = \text{atan}\left(\frac{\Delta x_{ik}}{\Delta y_{ik}}\right) - \text{atan}\left(\frac{\Delta x_{ij}}{\Delta y_{ij}}\right)$$

$$\bar{F}_\theta = \theta_{ijk} - \text{atan}\left(\frac{\Delta x_{ik}}{\Delta y_{ik}}\right) + \text{atan}\left(\frac{\Delta x_{ij}}{\Delta y_{ij}}\right) = 0$$

$$\Delta x_{ik} = x_k - x_i$$

$$\Delta y_{ik} = y_k - y_i$$



$$\frac{\partial \bar{F}_\theta}{\partial x_i} = \frac{\Delta y_{ik}}{D_{ik}^2} - \frac{\Delta y_{ij}}{D_{ij}^2} \quad \left. \begin{array}{l} \frac{\partial \bar{F}_\theta}{\partial x_i} = -\frac{\Delta x_{ik}}{D_{ik}^2} + \frac{\Delta x_{ij}}{D_{ij}^2} \\ \frac{\partial \bar{F}_\theta}{\partial x_j} = -\frac{\Delta x_{ij}}{D_{ij}^2} \\ \frac{\partial \bar{F}_\theta}{\partial x_k} = \frac{\Delta x_{ik}}{D_{ik}^2} \end{array} \right\}$$

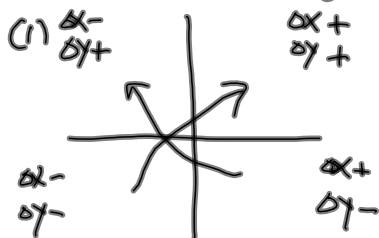
$$\frac{\partial \bar{F}_\theta}{\partial x_j} = \frac{\Delta y_{ij}}{D_{ij}^2}$$

$$\frac{\partial \bar{F}_\theta}{\partial x_k} = \frac{-\Delta y_{ik}}{D_{ik}^2}$$

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Misdirection vector $f = -F(\theta, r)$ 18-2

- 2 pit falls:
- (1) getting computed θ in right quadrant
use $\text{atan2}(\Delta x, \Delta y)$
 - (2) subtracting over the angle discontinuity



- (2) subtracting over discontinuity

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18-3

$\alpha_{ik} - \alpha_{ij}$

$10 - 350 = -340 (+360) = 20$
if neg. +360

$\alpha_{ik} - \alpha_{ij}$

$170 - 190 = -20 (+360) = 340$
if neg. +360

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18-4

i : 20
k : 22
j : 21

x_1, x_2, x_3, x_4 x_{10}, y_{10}

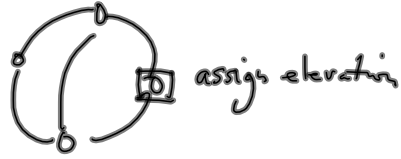
P matrix

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minimal constraints

18-5

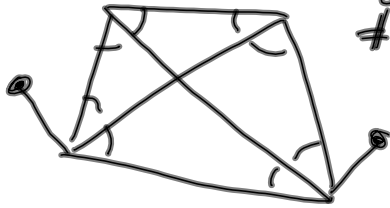
1D network



of minimal constraints = 1

2D network

horizontal network, only angle measurements

# of minimal constraints
= 4

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