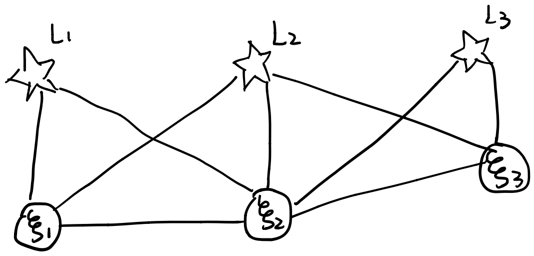
1、



(1) 绘制上述系统的信息矩阵 $\underline{\underline{\Lambda}}$.

对应公式(42) $\underline{\xi} = \begin{bmatrix} \xi_1 \\ \xi_2 \\ \xi_3 \\ L_1 \\ L_2 \\ L_3 \end{bmatrix}$ $\quad \underline{r} = \begin{bmatrix} r_{\xi_1 L_1} \\ r_{\xi_1 L_2} \\ r_{\xi_1 \xi_2} \\ r_{\xi_2 L_1} \\ r_{\xi_2 L_2} \\ r_{\xi_2 L_3} \\ r_{\xi_2 \xi_3} \\ r_{\xi_3 L_2} \\ r_{\xi_3 L_3} \end{bmatrix}$

$$\underline{\underline{J}} = \frac{\partial \underline{r}}{\partial \underline{\xi}} = \begin{bmatrix} \frac{\partial r_{\xi_1 L_1}}{\partial \underline{\xi}} \\ \frac{\partial r_{\xi_1 L_2}}{\partial \underline{\xi}} \\ \vdots \\ \frac{\partial r_{\xi_3 L_3}}{\partial \underline{\xi}} \end{bmatrix} = \begin{bmatrix} \underline{J_1} \\ \underline{J_2} \\ \vdots \\ \underline{J_9} \end{bmatrix}$$

残差项只与对应下标项有关，对 $\underline{\xi}$ 中的其他分量求导为0

$$\underline{J_1} = \frac{\partial r_{\xi_1 L_1}}{\partial \underline{\xi}} = \begin{bmatrix} \frac{\partial r_{\xi_1 L_1}}{\partial \xi_1} & 0 & 0 & \frac{\partial r_{\xi_1 L_1}}{\partial L_1} & 0 & 0 \end{bmatrix}$$

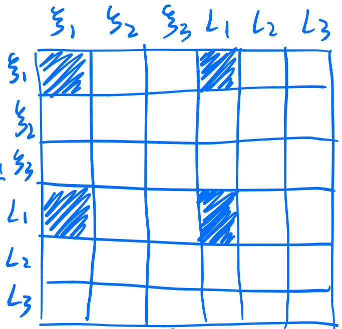
$\underline{J_2}$ 到 $\underline{J_9}$ 同理.

$$\underline{\underline{\Lambda_1}} = \underline{J_1}^T \underline{\underline{\Sigma_1}}^{-1} \underline{J_1} = \begin{bmatrix} \frac{\partial r_{\xi_1 L_1}}{\partial \xi_1} \\ 0 \\ 0 \\ \frac{\partial r_{\xi_1 L_1}}{\partial L_1} \\ 0 \\ 0 \end{bmatrix} \underline{\underline{\Sigma_1}}^{-1} \begin{bmatrix} \frac{\partial r_{\xi_1 L_1}}{\partial \xi_1} & 0 & 0 & \frac{\partial r_{\xi_1 L_1}}{\partial L_1} & 0 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} \frac{\partial r_{\xi_1 L_1}}{\partial \xi_1} \underline{\underline{\Sigma_1}}^{-1} \frac{\partial r_{\xi_1 L_1}}{\partial \xi_1} & 0 & 0 & \frac{\partial r_{\xi_1 L_1}}{\partial \xi_1} \underline{\underline{\Sigma_1}}^{-1} \frac{\partial r_{\xi_1 L_1}}{\partial L_1} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\partial r_{\xi_1 L_1}}{\partial L_1} \underline{\underline{\Sigma_1}}^{-1} \frac{\partial r_{\xi_1 L_1}}{\partial \xi_1} & 0 & 0 & \frac{\partial r_{\xi_1 L_1}}{\partial L_1} \underline{\underline{\Sigma_1}}^{-1} \frac{\partial r_{\xi_1 L_1}}{\partial L_1} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

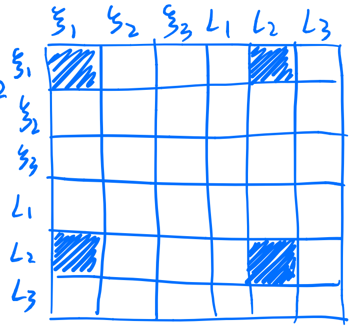
Λ_1

$J_1=\dfrac{\partial r_{\xi_1 L_1}}{\partial \xi}$



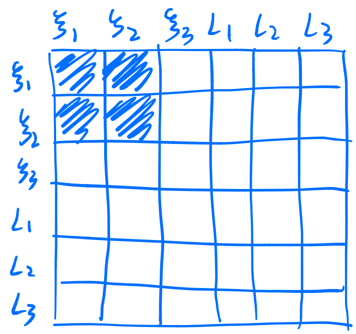
同理可得：Λ_2

$J_2=\dfrac{\partial r_{\xi_1 L_2}}{\partial \xi}$



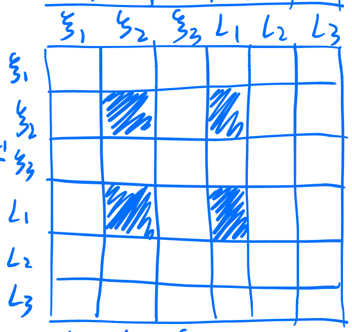
Λ_3

$J_3=\dfrac{\partial r_{\xi_1 \xi_2}}{\partial \xi}$



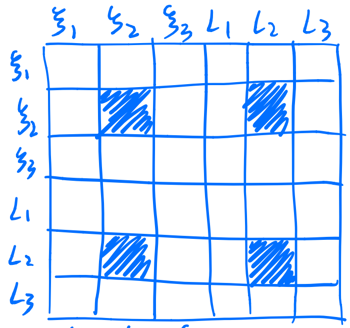
Λ_4

$J_4=\dfrac{\partial r_{\xi_2 L_1}}{\partial \xi}$



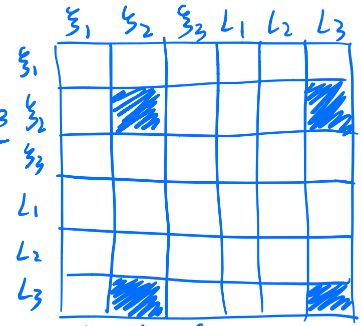
Λ_5

$J_5=\dfrac{\partial r_{\xi_2 L_2}}{\partial \xi}$



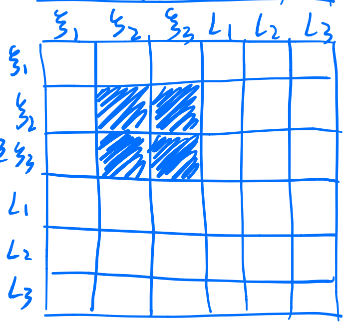
Λ_6

$J_6=\dfrac{\partial r_{\xi_2 L_3}}{\partial \xi}$



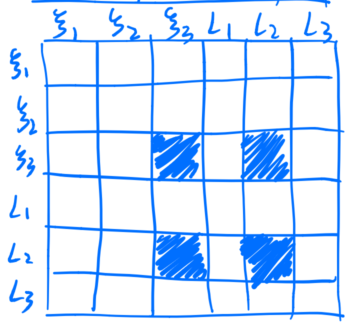
Λ_7

$J_7=\dfrac{\partial r_{\xi_2 \xi_3}}{\partial \xi}$



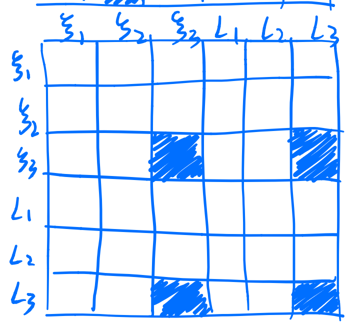
Λ_8

$J_8=\dfrac{\partial r_{\xi_3 L_2}}{\partial \xi}$

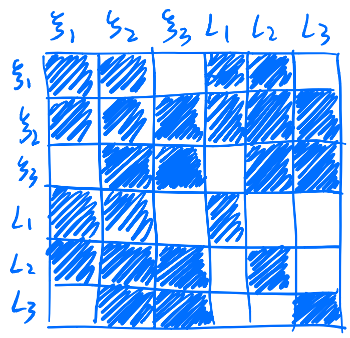


Λ_9

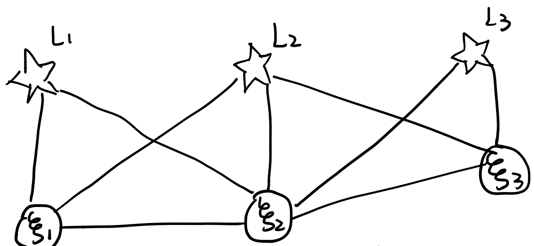
$J_9=\dfrac{\partial r_{\xi_3 L_3}}{\partial \xi}$



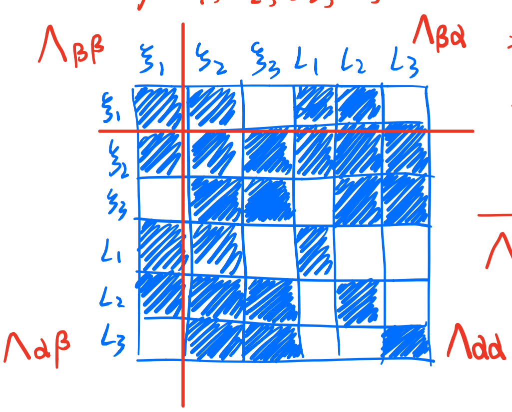
求和：Λ



(2) 绘制相机 ξ_1 被 marg 以后的信息矩阵 Λ'.



$p(\xi_1,\xi_2,\xi_3,L_1,L_2,L_3)$

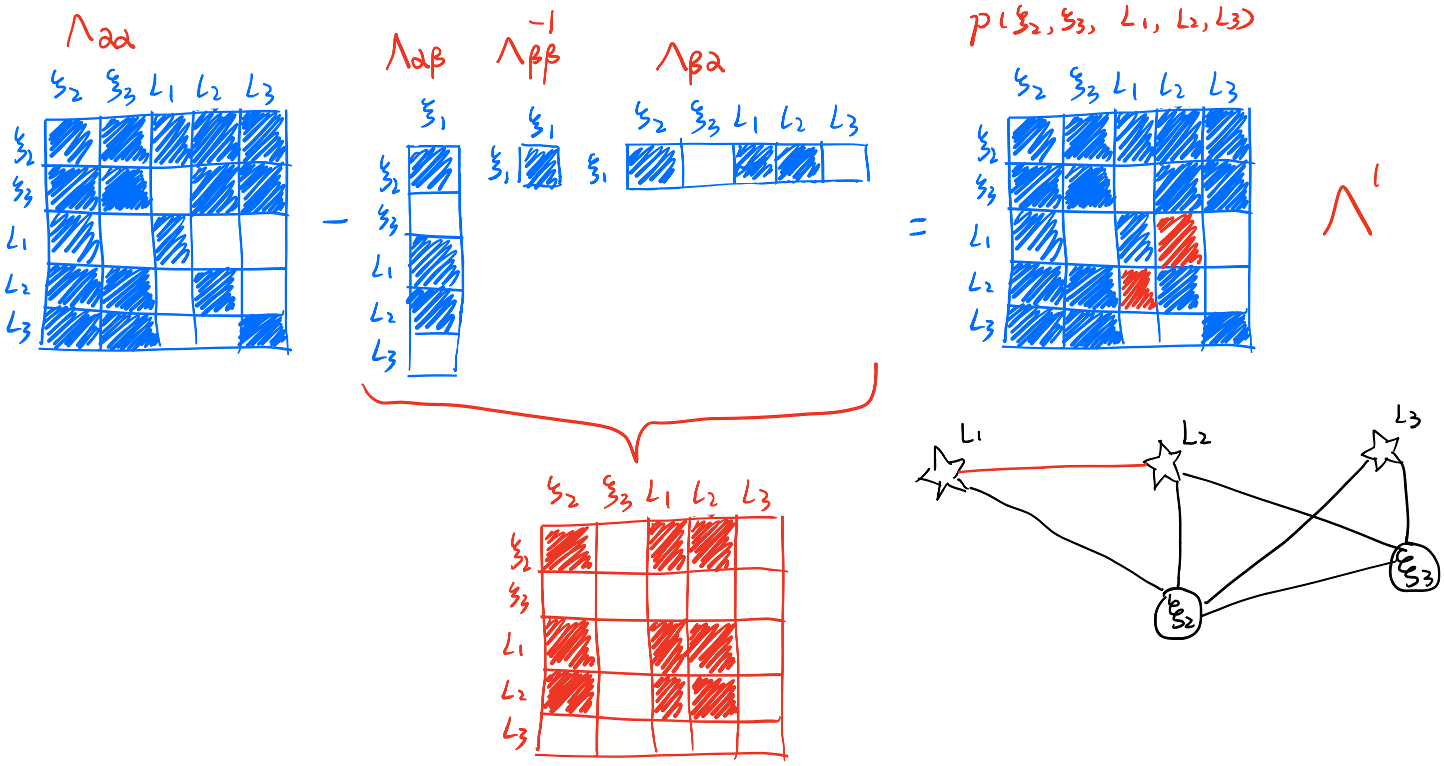


利用舒尔补从联合概率分布中求得边际概率 $p(\underbrace{\xi_2,\xi_3,L_1,L_2,L_3}_{\alpha})$

marg掉 $\underbrace{\xi_1}_{\beta}$

$\longrightarrow$

$\Lambda_{\alpha\alpha}-\Lambda_{\alpha\beta}\Lambda_{\beta\beta}^{-1}\Lambda_{\beta\alpha}$



Λαα
Λαβ
Λββ -1
Λβα
p(ξ2, ξ3, L1, L2, L3)
Λ'
ξ2 ξ3 L1 L2 L3
ξ1
L1
L2
L3
ξ3
ξ2