Since $\mathcal{L}(\theta^{acc}) = \sum_{k=1}^{N} (\|g\|^2 - \|h(a_k^s, \theta^{acc})\|^2)^2$

and $\theta^{acc} = (a_{xz}, a_{xy}, a_{yx}, S_x^a, S_y^a, S_z^a, b_x^a, b_y^a, b_z^a)$

$$\frac{\partial(\|g\|^2 - \|h(a_k^s, \theta^{acc})\|^2)}{\partial \theta^{acc}} = -2h(\cdot)^T \cdot \frac{\partial h(\cdot)}{\partial \theta^{acc}}$$

Besides, $h(a_k^s, \theta^{acc}) = T^a k^a (a^s - b^a)$

we set $h \equiv h(a_k^s, \theta^{acc})$

$h' = k^a(a^s - b^a)$, then, $h = Th'$

$h'' = a^s - b^a$, then $h = Tkh''$

Also, we know, $k = \begin{bmatrix} S_{ax} & 0 & 0 \\ 0 & S_{ay} & 0 \\ 0 & 0 & S_{az} \end{bmatrix}$ $\quad b = \begin{bmatrix} b_x \\ b_y \\ b_z \end{bmatrix}$

$$T = \begin{bmatrix} 1 & 0 & 0 \\ a_{xz} & 1 & 0 \\ -a_{xy} & a_{yx} & 1 \end{bmatrix}$$

So. $h = Th' = \begin{bmatrix} h_x' \\ a_{xz} h_x' + h_y' \\ -a_{xy} h_x' + a_{yx} h_y' + h_z' \end{bmatrix}$

$$\frac{\partial h}{\partial(a_{xz}, a_{xy}, a_{yx})} = \begin{bmatrix} 0 & 0 & 0 \\ h_x' & 0 & 0 \\ 0 & -h_x' & h_y' \end{bmatrix}$$

$$\frac{\partial h}{\partial(S_x^a, S_y^a, S_z^a)} = \begin{bmatrix} h_x'' & & \\ & h_y'' & \\ & & h_z'' \end{bmatrix}$$

$$\frac{\partial h}{\partial[b_x^a, b_y, b_z]} = -Tk$$

Jacobian:

So $$\frac{\partial(\|g\|^2 - \|h(a_k^s, \theta^{acc})\|^2)}{\partial \theta^{acc}} = -2h(\cdot)^T \left[\begin{matrix} 0 & 0 & 0 \\ h_x' & 0 & 0 \\ 0 & -h_x' & h_y' \end{matrix} , \mathrm{diag}(h''), -Tk \right]$$