

$$\partial^2 I_5/\partial f^p = 2 \begin{bmatrix} A_{1,1}I_3 & A_{1,2}I_3 & A_{1,3}I_3 \\ A_{2,1}I_3 & A_{2,2}I_3 & A_{2,3}I_3 \\ A_{3,1}I_3 & A_{3,2}I_3 & A_{3,3}I_3 \end{bmatrix}$$

where

$$A \in \mathbb{R}^{3 \times 3}$$