

$$\text{Contour of } \hat{x}_3^*(\mathbf{p}) \quad \text{Red hatched region: } n_1 m_3 \frac{\partial \hat{x}_3^*}{\partial p_1} \geq 0 \cap n_2 m_3 \frac{\partial \hat{x}_3^*}{\partial p_2} \geq 0 \cap n_3 m_3 \frac{\partial \hat{x}_3^*}{\partial p_3} \geq 0$$

