

$$M = \begin{pmatrix} \frac{-\sigma a + \alpha T_a + (-\alpha + \sigma a) T_y}{-1 + T_a} & \frac{(-1 + T_x) T_y (\alpha - \sigma a)}{-1 + T_a} & \frac{\theta (-1 + T_x) T_y}{-1 + T_a} \\ \frac{(-1 + T_y) (\alpha - \sigma a)}{-1 + T_a} & \frac{-\alpha + \sigma a T_a + (\alpha - \sigma a) T_y}{-1 + T_a} & \frac{\theta (-1 + T_y)}{-1 + T_a} \\ \phi & \phi & \Xi \end{pmatrix} /. Ta \to T_a // MatrixForm$$

$$\begin{pmatrix} \frac{-\sigma a + \alpha T_a + (-\alpha + \sigma a) T_y}{-1 + T_a} & \frac{(\alpha - \sigma a) (-1 + T_x) T_y}{-1 + T_a} & \frac{\theta (-1 + T_x) T_y}{-1 + T_a} \\ \frac{(\alpha - \sigma a) (-1 + T_y)}{-1 + T_a} & \frac{-\alpha + \sigma a T_a + (\alpha - \sigma a) T_y}{-1 + T_a} & \frac{\theta (-1 + T_y)}{-1 + T_a} \\ \phi & \phi & \Xi \end{pmatrix}$$

(M /. {T_a → τ_a + 1, T_x → τ_x + 1, T_y → τ_y + 1}) // Simplify // MatrixForm

$$\begin{pmatrix} \frac{\alpha \tau_a - \alpha \tau_y + \sigma a \tau_y}{\tau_a} & \frac{(\alpha - \sigma a) \tau_x (1 + \tau_y)}{\tau_a} & \frac{\theta \tau_x (1 + \tau_y)}{\tau_a} \\ \frac{(\alpha - \sigma a) \tau_y}{\tau_a} & \frac{\sigma a \tau_a + \alpha \tau_y - \sigma a \tau_y}{\tau_a} & \frac{\theta \tau_y}{\tau_a} \\ \phi & \phi & \Xi \end{pmatrix}$$

(M /. {T_a → τ_a + 1, T_x → τ_x + 1, T_y → τ_y + 1, α → α' + σa}) // Simplify // MatrixForm

$$\begin{pmatrix} \sigma a + \frac{(\tau_a - \tau_y) \alpha'}{\tau_a} & \frac{\tau_x (1 + \tau_y) \alpha'}{\tau_a} & \frac{\theta \tau_x (1 + \tau_y)}{\tau_a} \\ \frac{\tau_y \alpha'}{\tau_a} & \sigma a + \frac{\tau_y \alpha'}{\tau_a} & \frac{\theta \tau_y}{\tau_a} \\ \phi & \phi & \Xi \end{pmatrix}$$

(M /. {T_a → τ_a + 1, T_x → τ_x + 1, T_y → τ_y + 1, α → α' + σa} /. τ_a → τ_x τ_y + τ_x + τ_{y}) // Simplify // MatrixForm}

$$\begin{pmatrix} \frac{\sigma a (\tau_x + \tau_y + \tau_x \tau_y) + \tau_x (1 + \tau_y) \alpha'}{\tau_x + \tau_y + \tau_x \tau_y} & \frac{\tau_x (1 + \tau_y) \alpha'}{\tau_x + \tau_y + \tau_x \tau_y} & \frac{\theta \tau_x (1 + \tau_y)}{\tau_x + \tau_y + \tau_x \tau_y} \\ \frac{\tau_y \alpha'}{\tau_x + \tau_y + \tau_x \tau_y} & \frac{\sigma a (\tau_x + \tau_y + \tau_x \tau_y) + \tau_y \alpha'}{\tau_x + \tau_y + \tau_x \tau_y} & \frac{\theta \tau_y}{\tau_x + \tau_y + \tau_x \tau_y} \\ \phi & \phi & \Xi \end{pmatrix}$$