Rabbit abdominal skin experiment and "hyperelastic" curve fit

$$\rho_0 W^{(2)} = f(\alpha, E) + c \exp[F(a, E)], \qquad (4)$$

where

$$f(\alpha, E) = \alpha_1 E_{11}^2 + \alpha_2 E_{22}^2 + \alpha_3 E_{12}^2 + \alpha_3 E_{21}^2 + 2\alpha_4 E_{11} E_{22}, \qquad (5)$$

$$F(a, E) = a_1 E_{11}^2 + a_2 E_{22}^2 + a_3 E_{12}^2 + a_3 E_{21}^2 + 2a_4 E_{11} E_{22}. \qquad (6)$$
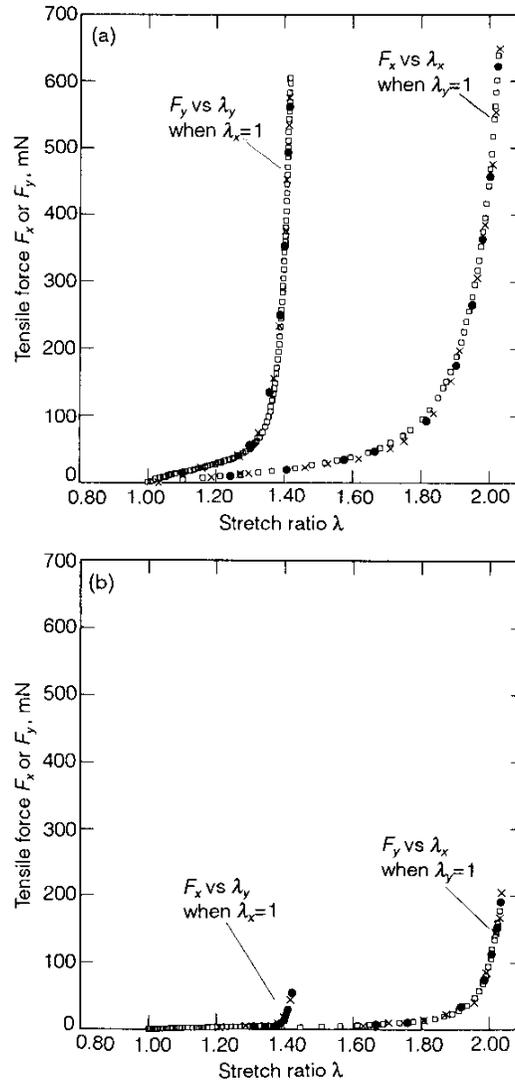

Figure 7.12:2 Comparison between experimental data and mathematical expression. The tensile forces F_x, F_y are given in milli Newton. Lagrange stress T_x is equal to F_x divided by A_x, the cross-sectional area perpendicular to the x axis. Squares: experimental data. Circles: from Eqs. (1) and (2) with $\alpha_1 = \alpha_2$, all γ's $= 0$. $a_1 = 3.79$, $a_2 = 12.7$, $a_4 = 0.587$, $c = 0.779$ N/m^2, $\alpha_1 = \alpha_2 = 1,020$ N/m^2, and $\alpha_4 = 254$ N/m^2. Crosses: From Eq. (2) with $\alpha_1 = \alpha_2$, $\gamma_1 = \gamma_2 = 0$, $\gamma_4 = \gamma_5 \neq 0$. $a_1 = 3.79$, $a_2 = 18.4$, $a_4 = 0.587$, $c = 0.779$ N/m^2, $\alpha_1 = \alpha_2 = 1,020$ N/m^2, and $a_4 = 254$ N/m^2. $\gamma_4 = \gamma_5 = 15.6$. From Tong and Fung (1976), by permission. Experimental data are from Lanir and Fung (1974b).