

$$x_2 = x_1 - y_1^2 \left(1 - \frac{y_1^2}{12\rho_b^2}\right) \frac{p_1^2}{2\rho_b(p_1^2 - p_{x1}^2)^{3/2}} ,$$

$$p_{y2} = p_{y1} + p_{x1} \left(1 - \frac{y_1^2}{6\rho_b^2}\right) \frac{y_1}{p_1\rho_b \sqrt{p_1^2 - p_{x1}^2}} ,$$

$$z_2 = z_1 + p_{x1}y_1^2 \left(1 - \frac{y_1^2}{12\rho_b^2}\right) \frac{p_1}{2\rho_b(p_1^2 - p_{x1}^2)^{3/2}} .$$