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

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

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