The transformation for the correction term
$$\Delta H = H - H_2$$
 for $1/\rho = 0$:
$$\Delta H = -\sqrt{p^2 - (p_x - a_c)^2 - (p_y - a_y)^2} + p - \frac{(p_x - a_x)^2}{2p} - \frac{(p_y - a_y)^2}{2p}$$

$$= p - p_z - \frac{(p_x - a_x)^2}{2p} - \frac{(p_y - a_y)^2}{2p},$$

$$a_x = -\frac{B_z}{2}y,$$

$$a_y = \frac{B_z}{2}x,$$
(48)

(47)

(50)

(51)

(52)

(53)

(54)

(58)

is written as
$$x = x_0 + \Delta x \,, \label{eq:x0}$$

$$y = y_0 + \Delta y$$
, $p_x = p_{x0} + \frac{B_z}{2} \Delta y$, $p_y = p_{y0} - \frac{B_z}{2} \Delta x$.

$$p_y = p_{y0} - \frac{B_z^2}{2} \Delta x \,, \label{eq:py0}$$
 where

here
$$\Delta x = \left(p_{x0} + \frac{B_z}{2}y_0\right)\sin w\ell - \left(p_{y0} - \frac{B_z}{2}x_0\right)(\cos w\ell - 1),$$

where
$$\Delta x = \left(p_{x0} + \frac{B_z}{2}y_0\right)\sin w\ell - \left(p_{y0} - \frac{B_z}{2}x_0\right)(\cos w\ell - 1),\tag{55}$$

$$\Delta x = \left(p_{x0} + \frac{B_z}{2}y_0\right)\sin w\ell - \left(p_{y0} - \frac{B_z}{2}x_0\right)(\cos w\ell - 1),$$

$$\Delta y = \left(p_{x0} + \frac{B_z}{2}y_0\right)(\cos w\ell - 1) + \left(p_{x0} - \frac{B_z}{2}x_0\right)\sin w\ell$$

$$\Delta y = \left(p_{x0} + \frac{B_z}{2}y_0\right) \sin w\ell \quad \left(p_{y0} - \frac{B_z}{2}x_0\right) (\cos w\ell - 1) + \left(p_{y0} - \frac{B_z}{2}x_0\right) \sin w\ell ,$$

$$\Delta y = \left(p_{x0} + \frac{B_z}{2}y_0\right)(\cos w\ell - 1) + \left(p_{y0} - \frac{B_z}{2}x_0\right)\sin w\ell,$$

$$w = \frac{B_z(p - p_z)}{2}.$$
(56)

 $z = z_0 + \left(\frac{3}{2} - \frac{p}{n_x} - \frac{p_z^2}{2n^2} + \Delta v\right) \ell$.

$$\Delta y = \left(p_{x0} + \frac{B_z}{2}y_0\right)\left(\cos w\ell - 1\right) + \left(p_{y0} - \frac{B_z}{2}x_0\right)\sin w\ell,$$

$$B_z(p - p_z)$$

$$w = \frac{B_z(p - p_z)}{pp_z} \,.$$

The longitudinal coordinate is transformed as: