<u>Case $z_i > 0$:</u>

$$0 = \alpha - \rho\left(x_i^{(k+1)} - z_i^{(k+1)} + u_i^{(k)}\right)$$

$$z_i^{(k+1)} = x_i^{(k+1)} + u_i^{(k)} - \frac{\alpha}{\rho}$$

<u>Case $z_i = 0$</u>

$$0 = \alpha[-1, 1] - \rho\left(x_i^{(k+1)} - z_i^{(k+1)} + u_i^{(k)}\right)$$

$$z_i^{(k+1)} \in x_i^{(k+1)} + u_i^{(k)} - \frac{\alpha}{\rho}[-1, 1]$$

Combine the derived coordinatewise optimality conditions to obtain $z^{(k+1)}$:

$$z^{(k+1)} = \begin{cases} x^{(k+1)} + u^{(k)} + \alpha/\rho, & x^{(k+1)} + u^{(k)} < -\alpha/\rho, \\ x^{(k+1)} + u^{(k)} - \alpha/\rho, & x^{(k+1)} + u^{(k)} > \alpha/\rho, \\ 0, & -\frac{\alpha}{\rho} \leq x^{(k+1)} + \mu^{(k)} \leq \frac{\alpha}{\rho}. \end{cases}$$

Equivalently, $z^{(k+1)} = S_{\frac{\alpha}{\rho}}\left(x^{(k+1)} + u^{(k)}\right)$.

<u>**STEP 3**</u> : $u^{(k+1)} \leftarrow u^{(k)} + x^{(k+1)} - z^{(k+1)}$

Given $u^{(k)}$ and steps 1 and 2, we obtain $u^{(k+1)}$.