In eq.s (A.13), (A.14), (A.15) the term $-3\,z\,H$ should be $-3\,H$.
In eq.s (A.18) and (A.19) the quantity $\widehat{\Gamma}_i$ should be $\widetilde{\Gamma}_i \equiv d\Gamma_i/dz$.
Equation (A.17) should be (note, in the denominator, $\hat{\rho}_{e\gamma}$ instead of $\hat{\rho}_{e\gamma B}$)

$$\frac{d\phi_e}{dz} = \frac{1}{z}\,\frac{\hat{L}\,\kappa_1 + \left(\hat{\rho}_{e\gamma B} + \hat{\mathrm{p}}_{e\gamma B} + \frac{\mathcal{N}(z)}{3}\right)\,\kappa_2}{\hat{L}\,\frac{\partial \hat{\rho}_e}{\partial \phi_e} - \frac{\partial \hat{L}}{\partial \phi_e}\left(\hat{\rho}_{e\gamma} + \hat{\mathrm{p}}_{e\gamma B} + \frac{\mathcal{N}(z)}{3}\right)} \tag{1}$$

where

$$\begin{aligned} \kappa_1 &= 4\,(\hat{\rho}_e + \hat{\rho}_\gamma) + \frac{3}{2}\,\hat{\mathrm{p}}_B - z\,\frac{\partial \hat{\rho}_e}{\partial z} - z\,\frac{\partial \hat{\rho}_\gamma}{\partial z} + \frac{1}{\hat{L}}\left(3\,\hat{L} - z\,\frac{\partial \hat{L}}{\partial z}\right)\hat{\rho}_B - \frac{z^2\,\hat{L}}{\sum_j Z_j\,X_j}\sum_i\left(\Delta\widehat{M}_i + \frac{3}{2\,z}\right)\widetilde{\Gamma}_i \\ \kappa_2 &= z\,\frac{\partial \hat{L}}{\partial z} - 3\,\hat{L} - z\,\hat{L}\,\frac{\sum_i Z_i\,\widetilde{\Gamma}_i}{\sum_j Z_j\,X_j} \end{aligned} \tag{2}$$

The same is true for equation (A.22), where the identical denominator appears

$$\frac{dX_i}{dz} = \dot{X}_i\,\frac{dt}{dz} = -\frac{\widehat{\Gamma}_i}{3z\,\widehat{H}}\,\frac{\kappa_1\,\frac{\partial \hat{L}}{\partial \phi_e} + \kappa_2\,\frac{\partial \hat{\rho}_{e\gamma B}}{\partial \phi_e}}{\hat{L}\,\frac{\partial \hat{\rho}_e}{\partial \phi_e} - \frac{\partial \hat{L}}{\partial \phi_e}\left(\hat{\rho}_{e\gamma} + \hat{\mathrm{p}}_{e\gamma B} + \frac{\mathcal{N}(z)}{3}\right)} \tag{3}$$

The numerator in eq. (1) can be simplified (restoring the symmetry with the second term in the denominator) because some terms in $\hat{L}\,\kappa_1$ are the opposite of the corresponding ones in $\left(\hat{\rho}_{e\gamma B} + \hat{\mathrm{p}}_{e\gamma B} + \frac{\mathcal{N}(z)}{3}\right)\,\kappa_2$

$$\frac{d\phi_e}{dz} = \frac{1}{z}\,\frac{\hat{L}\,\kappa_1' + \left(\hat{\rho}_{e\gamma} + \hat{\mathrm{p}}_{e\gamma B} + \frac{\mathcal{N}(z)}{3}\right)\,\kappa_2}{\hat{L}\,\frac{\partial \hat{\rho}_e}{\partial \phi_e} - \frac{\partial \hat{L}}{\partial \phi_e}\left(\hat{\rho}_{e\gamma} + \hat{\mathrm{p}}_{e\gamma B} + \frac{\mathcal{N}(z)}{3}\right)} \tag{4}$$

where

$$\kappa_1' = 4\,(\hat{\rho}_e + \hat{\rho}_\gamma) + \frac{3}{2}\,\hat{\mathrm{p}}_B - z\,\frac{\partial \hat{\rho}_e}{\partial z} - z\,\frac{\partial \hat{\rho}_\gamma}{\partial z} - \frac{z^2\,\hat{L}}{\sum_j Z_j\,X_j}\sum_i\left(\Delta\widehat{M}_i + \frac{3}{2\,z}\right)\widetilde{\Gamma}_i \tag{5}$$

The same applies to the numerator in eq. (3)

$$\frac{dX_i}{dz} = -\frac{\widehat{\Gamma}_i}{3\,z\,\widehat{H}}\,\frac{\kappa_1'\,\frac{\partial \hat{L}}{\partial \phi_e} + \kappa_2\,\frac{\partial \hat{\rho}_e}{\partial \phi_e}}{\hat{L}\,\frac{\partial \hat{\rho}_e}{\partial \phi_e} - \frac{\partial \hat{L}}{\partial \phi_e}\left(\hat{\rho}_{e\gamma} + \hat{\mathrm{p}}_{e\gamma B} + \frac{\mathcal{N}(z)}{3}\right)} \tag{6}$$

As a consequence, eq. (A.21) can be written

$$\frac{dt}{dz} = -\frac{1}{3\,z\,H}\,\frac{\kappa_1'\,\frac{\partial \hat{L}}{\partial \phi_e} + \kappa_2\,\frac{\partial \hat{\rho}_e}{\partial \phi_e}}{\hat{L}\,\frac{\partial \hat{\rho}_e}{\partial \phi_e} - \frac{\partial \hat{L}}{\partial \phi_e}\left(\hat{\rho}_{e\gamma} + \hat{\mathrm{p}}_{e\gamma B} + \frac{\mathcal{N}(z)}{3}\right)} \tag{7}$$