note

xxy

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$$U_{\mathcal{X}}(x,y,\boldsymbol{z}) = \lambda_M R_s(x) - |g_{je}|^2 xy$$
$$U_{\mathcal{Y}}(x,y,\boldsymbol{z}) = |g_{je}|^2 xy - \xi x + \lambda log(1+\sum_{i=1}^{N} z_i) - \eta y$$
$$U_{\mathcal{Z}_i}(x,y,z_i,z_{-i}) = \eta y \ \frac{\omega_i z_i}{\sum_{j=1}^{N} \omega_j z_j} - \theta_i z_i$$
$$R_s(x) = R_M - \log_2\left(1 + \frac{P_M |g_{Me}|^2/N_0}{1+x(|g_{je}|^2/N_0+\sigma_{ke})}\right)$$