

$$\begin{aligned} \hat{f}_{k+1}(\mathbf{x}_{k+1}) - \hat{f}_{k+1}^* \leq & \\ & (1-\alpha\mu')^k(\hat{f}_0(\mathbf{x}_0) - \hat{f}_0^* - \eta^* - \eta_0) \\ & + \frac{\alpha}{c} \sum_{t=0}^k (1-\alpha\mu')^{k-t} \hat{f}_t^* + \frac{\eta^* + \eta_0}{\alpha\mu'}. \end{aligned}$$