Notes on MPC Math in Kernel Module

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July 20, 2018

This document contains transformations to make the MPC equation more manageable in code.

$$\begin{aligned} r(n) &= \frac{\left(\frac{\xi}{\mu_r(n-1)} - \frac{b_1}{\mu_l(n)}\right)\frac{\mu_v(n)}{2\psi b_1} + \mu_l(n) - \left[\hat{l}(n+1)\right]_{r(n)=0}}{b_1} \\ &= \frac{\mu_v(n)\xi}{2b_1^2\mu_r(n-1)\psi} - \frac{\mu_v(n)}{2b_1\mu_l(n)\psi} + \frac{\mu_l(n)}{b_1} - \frac{\left[\hat{l}(n+1)\right]_{r(n)=0}}{b_1} \\ &= \frac{\mu_v(n)\xi}{2b_1^2\mu_r(n-1)\psi} + \frac{\mu_l(n)}{b_1} - \left(\frac{\mu_v(n)}{2b_1\mu_l(n)\psi} + \frac{\left[\hat{l}(n+1)\right]_{r(n)=0}}{b_1}\right) \end{aligned}$$

Let $c_d = 2b_1\psi$, then

$$r(n) = \frac{\mu_v(n)\xi}{b_1\mu_r(n-1)c_d} + \frac{\mu_l(n)}{b_1} - \left(\frac{\mu_v(n)}{\mu_l(n)c_d} + \frac{\left[\hat{l}(n+1)\right]_{r(n)=0}}{b_1}\right)$$