ENEE 765 Fall 2017

Homework 3
due October $\underline{5}$

1. For the least squares algorithm (with normalization, and covariance resetting),

$$\dot{\phi} = \dot{\theta} = \frac{-\gamma P w e_1}{1 + \varepsilon_0 w^T w} \qquad \gamma > 0, \ \varepsilon_0 > 0 \ \text{constants}$$

$$\dot{P} = \frac{-\gamma P w w^T P}{1 + \varepsilon_0 w^T P w}$$

$$P(t_0) = P(t_r^+) = k_0 \mathbb{1} > 0 \quad \text{(resetting)}$$

where $t_r = \{ t \mid \lambda_{min}(P(t)) \leq k_1 < k_0 \}$.

Suppose $w : \mathbb{R}_+ \rightarrow \mathbb{R}^{2n}$ is piecewise continuous. Then

(i) $\dfrac{e_1}{\sqrt{1 + \varepsilon_0 w^T P w}} \in L_2 \cap L_\infty$

(ii) $\phi \in L_\infty$, $\dot{\phi} \in L_2 \cap L_\infty$

(iii) $\beta = \dfrac{\phi^T w}{1 + \| w_t \|_\infty} \in L_2 \cap L_\infty$

2. READ <u>SASTRY-BODSON</u> till end of section 2-5 (page 76)