# Contents

*"Smack my pitch up."*

The Prodigy (1997)

# 1 Optimal control of pitch/travel with no feedback

## 1.1 State space form

We want to write the model in equation 1.1.1 in continuous time state space form with $x = [\lambda \ r \ p \ \dot{p}]^T$ and $u = p_c$

$$\dot{x} = A_c x + B_c u \tag{1.1.1}$$

*"I've got 99 problems, but a pitch ain't one."*

Ice-T (1993)

# 2 Optimal control of pitch/travel with LQ control

# 3 Optimal control of pitch/travel and elevation with and without feedback

# 4 Stolen latex source from report writing document

$$\ddot{e} + K_3 K_{ed} \dot{e} + K_3 K_{ep} e = K_3 K_{ep} e_c \tag{4.0.2a}$$
$$\ddot{p} + K_1 K_{pd} \dot{p} + K_1 K_{pp} p = K_1 K_{pp} p_c \tag{4.0.2b}$$
$$\dot{\lambda} = r \tag{4.0.2c}$$
$$\dot{r} = -K_2 p \tag{4.0.2d}$$