MULTI-CONVEXITY BASED LPV $\mathcal{L}_2$-GAIN SYNTHESIS FOR A SELF-BALANCING BICYCLE

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A scheduled controller is designed for self-balancing of a downscaled bicycle during riding. The controller could provide desirable performance for the velocity range [1, 4] m/s and the lean angle range [-8,+8] deg. The velocity and lean angle references could be controlled in real time by an operator. Tests with both varying and constant velocity showed that the the bicycle could maintain its balance with a maximum tracking error of 2 deg and a steady state error of 0.25 deg.