ABSTRACT

In the case of motorcycle riding not only performance and safety are important factors, the comfort aspect of driving is also important because the roads are not always flat, therefore the suspension components must support the comfort aspects and reduce injuries to the wrists, spine, and shoulder while riding a motorcycle.

The main purpose of this research is to create a prototype motorcycle suspension system that can keep the vehicle platform stable with the help of LQR (Liniear Quadratic Regulator) control method. The expected result of this research is to compare the performance of active and passive suspension systems in maintaining the stability of the ½ motorcycle model prototype against road disturbance.

The weight of the matrix Q and R is very influential for stability, the matrix Q has an effect on which parameters will be given a penalty if it is not stable, the matrix R influences response of the actuator. The results obtained from simulation of the ½ motorcycle model showed that ***Rise Time*** *increased by* ***± 13%,*** ***Overshoot*** *decreased by* ***± 5%,*** ***Settling Time*** *reduced by* ***± 78%,*** *and the time to reach* ***Steady State*** *conditions decreased by* ***± 77%.***

The results of the closed loop system of the ½ motorcycle model prototype test also showed, better results compared to the Open loop system. Test parameters such as ***Body Displacement*** *reduced by* ***± 68%,*** ***Body Velocity*** *reduced by* ***± 25%,*** ***Wheel Displacement*** *reduced by* ***± 70%,*** *and* ***Wheel Velocity*** *increased by* ***± 16%.***

Keywords : Active Suspension, LQR, ½ Motorcycle Model