ABSTRACT

Anti-roll bar is a connecting component between suspensions, which is commonly found in sports cars and off-road cars. Anti-roll bar serves to minimize body roll that occurs in the body of the car when the car gets an inertial force when turning or uneven ground conditions. But the anti-roll bar also affects driving comfort. Conventional anti-roll bar is an steel rod that connects the right suspension and left suspension to be connected directly, so that if one of the suspensions receives the force due to body roll, the other suspension will adjust and minimize body roll mechanically. Conventional anti-roll bars can be developed by adding electric motor as actuator.

This research, discusses the development of anti-roll bar by using *full-state feedback* control systems and *estimators*. To do the control design, system modeling should be performed. Then the control is designed to the match the desired system characteristics. This controlled anti-roll bar is tested by using the *hardware in the loop* method. The analysis is made using the ARB rotation angle as the system input.

In this study, it was found that the use of *full-state feedback* controls and *estimators* can change the characteristics of the electric anti-roll bar so that it can reduce body roll oscillation. The use of *full-state feedback*controls is very dependent on the use of sensors, so that additional *estimators* are needed. In this investigation, the Hardware in the Loop method has a minimum error value of 0.71%.

Keywords : Anti-Roll Bar, Body Roll, *Full-State Feedback, Estimator*, *Hardware in the Loop,* Modelling.