

Analysis of the influences of design parameters on weave mode stability

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The stability of motorcycles in weave mode is discussed. This study shows that the stability of the weave mode at high speeds may qualitatively differ depending on the vehicle specifications used in eigenvalue calculations. Eigenvalue calculations are performed, using vehicle specifications for medium-sized motorcycles and data for large motorcycles. The calculation results are used to consider the factors behind the differences in stability between the two vehicles at high speeds.

The results of the examination are summarized below.

① In medium-sized motorcycles, the weave mode initially becomes unstable as the vehicle speed increases, but there is a vehicle speed (peak speed) at which it stabilizes.

One of large motorcycles does not have a peak vehicle speed.

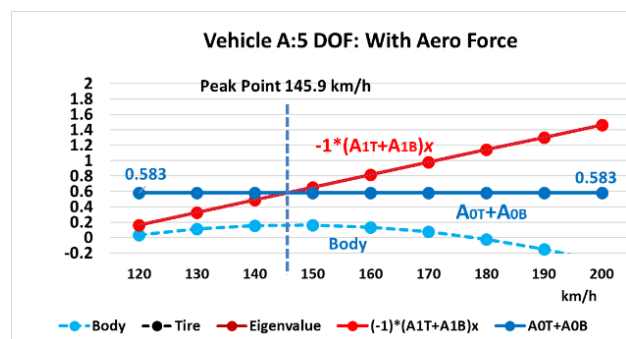


Fig. 1 Eigenvalue Real Part Peak Speed for Medium Size Motorcycle A

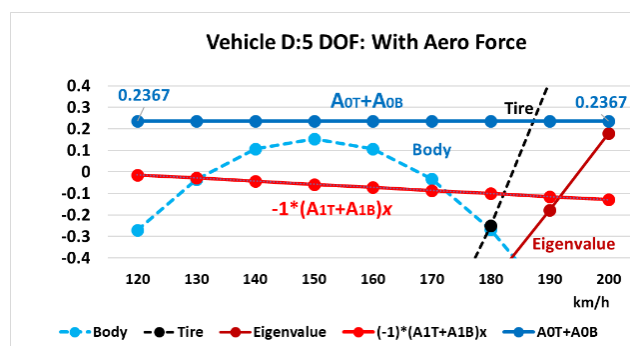


Fig. 2 Eigenvalue Real Part Non Peak Speed for Big Size Motorcycle D

③ Whether or not peak vehicle speed exists is greatly influenced by the phase of the steering angle vector included in the equation that determines the side force on the front tires.

④ When the phase of the steering angle vector advances with the vehicle speed, then a peak vehicle speed exists.

⑤ When the phase of the steering angle vector lags, there is no peak vehicle speed.

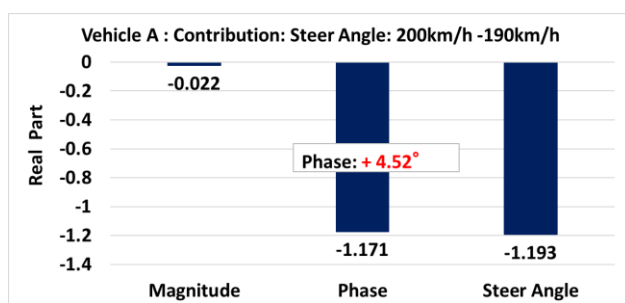


Fig. 3 Contribution to Real Part of Front SF for Medium Size Motorcycle A

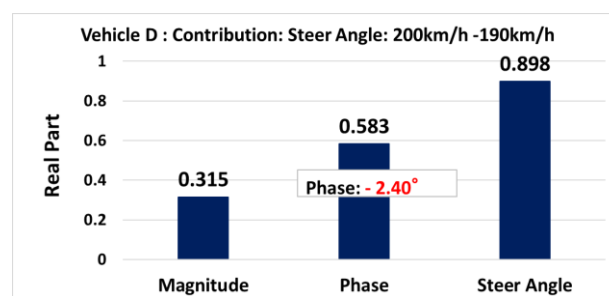


Fig. 4 Contribution to Real Part of Front SF for Big Size Motorcycle D

The next challenge is to establish a method for calculating the phase of the steering angle vector.