

## Module 7 - characteristic speed

For an understeer vehicle,

$$\left( \text{understeer condition: } \frac{W_F}{C_{\alpha F}} > \frac{W_R}{C_{\alpha R}} \right)$$

the understeer level may be

quantified by a parameter known

as the characteristic speed.

characteristic speed is the speed

at which the steer angle required

to negotiate any turn is the twice

the Ackerman angle:

$$\delta = 2 \frac{L}{R} = \frac{L}{R} + K \frac{U_{\text{char}}^2}{gR}$$

$$U_{\text{char}}^2 = \frac{gR}{K} \cdot \frac{L}{R} \quad \text{or} \quad U_{\text{char}} = \sqrt{\frac{gL}{K}} \quad (57.3)$$

## Critical speed

This is the speed above which an oversteer vehicle became unstable.

At this speed the steer angle

for any turn is zero.

(oversteer:  $\frac{W_f}{C_{\alpha f}} < \frac{W_r}{C_{\alpha r}}$ )

$$\delta = \frac{L}{R} + K \frac{u^2}{gR}$$

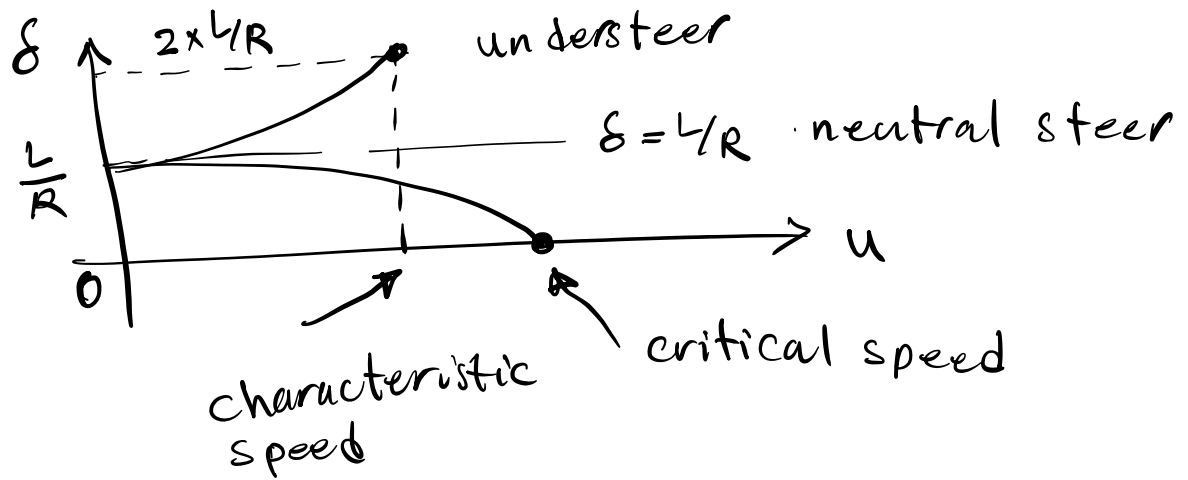
$$0 = \frac{L}{R} + K \frac{u_{\text{crit.}}^2}{gR}$$

$$\Rightarrow u_{\text{crit}} = \sqrt{\frac{-Lg (57.3)}{K}} \quad \rightarrow K \text{ is negative}$$

$u_{\text{crit}}$  depends on  $L$ . For a given

$K$ , a larger wheel base results in

a higher critical speed (less unstable)



$$\delta = \frac{L}{R} + k_0 a_y$$