

## Conclusions

- For small slip angle we assume a linear relationship between  $\mu_y = \frac{F_y}{F_z}$  and slip angle.
- Lateral force is function of slip angle, normal force, and material properties of the tire and the road.
- For low normal force we can assume a linear relationship between Lateral force and normal force.

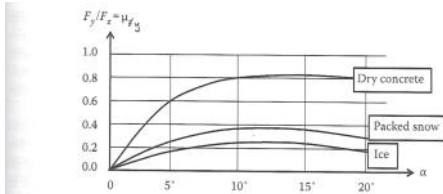
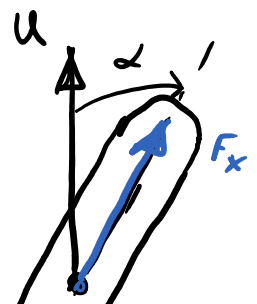
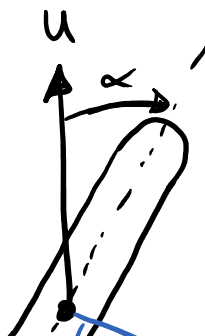
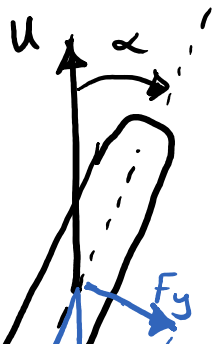
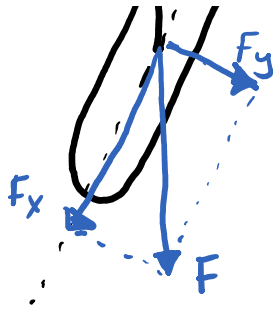


FIGURE 4.2  
The ratio of side force to normal force for a tire on several surfaces as a function of slip angle.

## Combined Lateral and Longitudinal Force Generation

Tires in general generate lat and lon tire forces. Maximum lateral force can only be generated when longitudinal force is zero and max long. force can only be generated when lat. force is minimal.



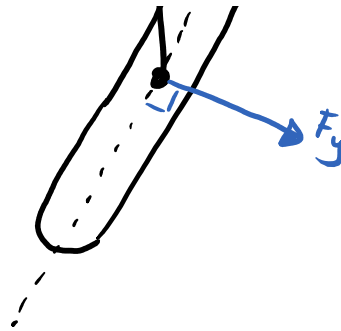


### Brakes locked

simple Coulomb friction behavior

small  $\alpha$  minimizes  $F_y$   
large  $\alpha$  maximize  $F_y$

$$s_B = 1$$

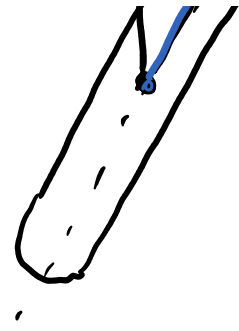


### Pure rolling

$$F_x = 0$$

$F_y$  can be maximized by increasing  $\alpha$

$$s_B = s_D = 0$$



### Burnout

$$F_y = 0$$

$$s_D = 1$$

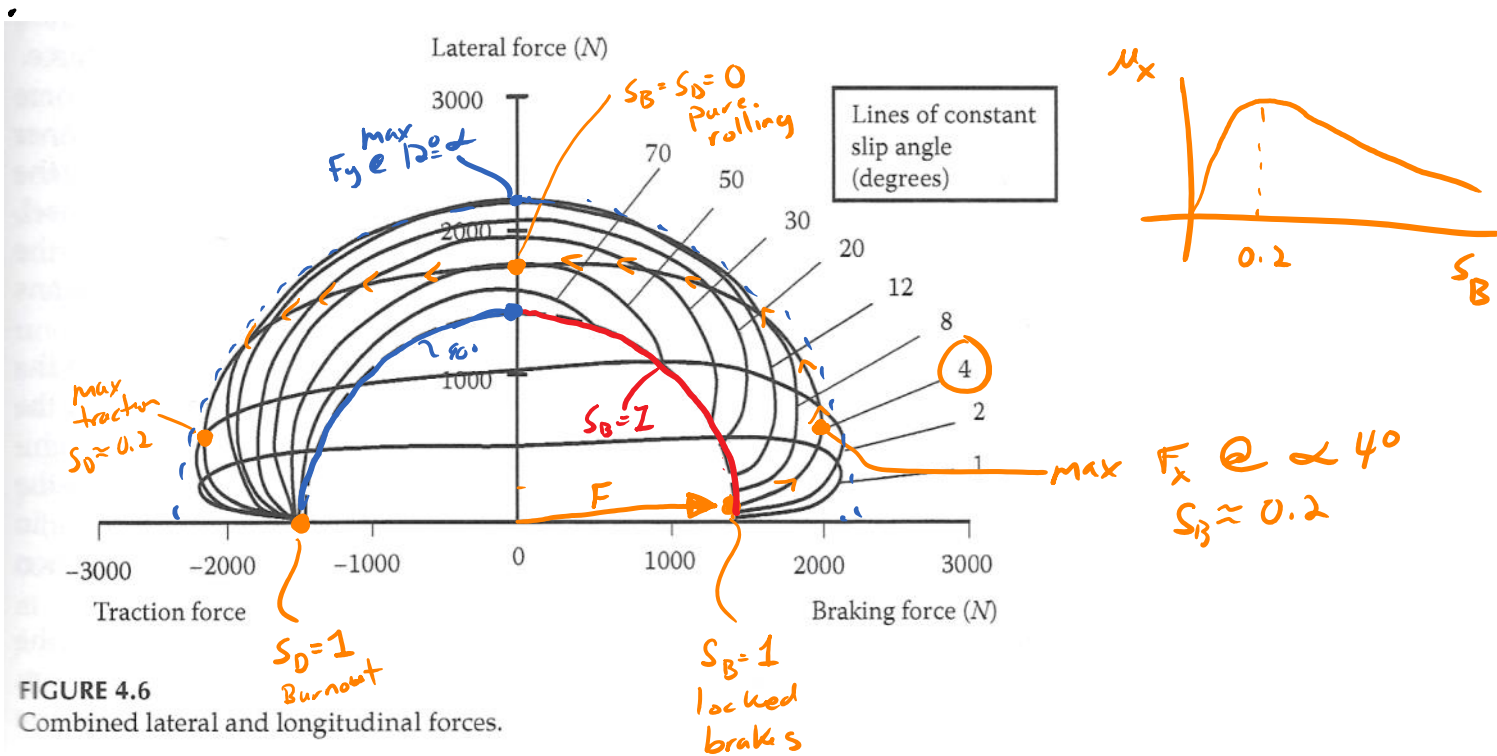


FIGURE 4.6 Combined lateral and longitudinal forces.