SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35.

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DEPARTMENT OF AUTOMOBILE ENGINEERING

COURSE NAME : 19AUB202 – AUTOMOTIVE SYSTEMS

II YEAR / III SEMESTER

Unit 2 – Steering System

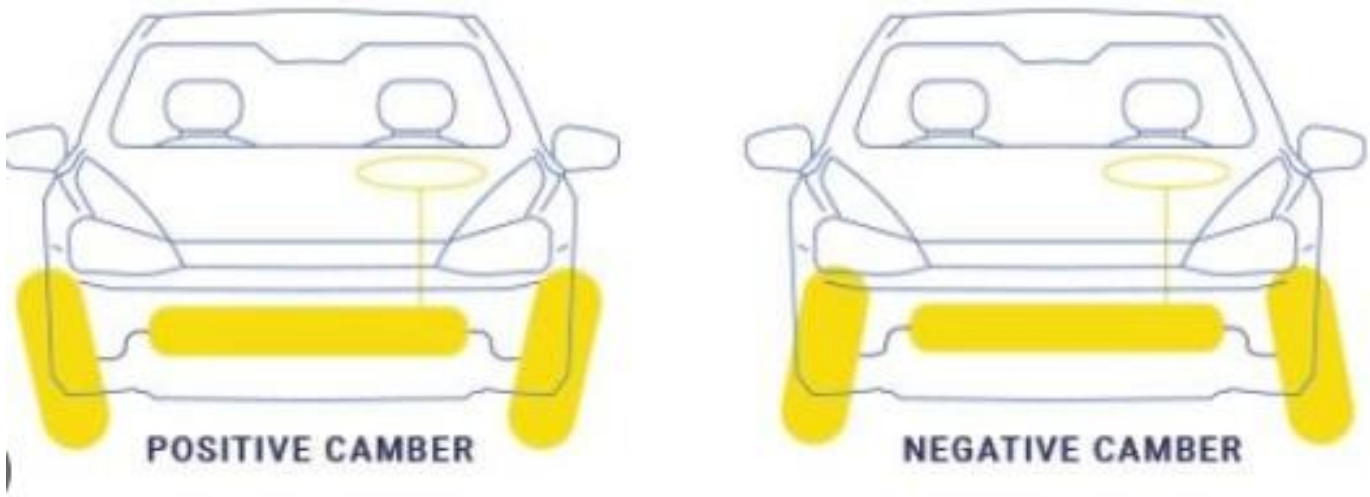
Topic : Front Wheel Alignment and steering geometry

FRONT WHEEL ALIGNMENT

- Front wheel alignment refers to the adjustment of the angles at which the front wheels of a vehicle make contact with the road.
- There are three main angles that need to be considered when aligning the front wheels:
  - Caster
  - Camber
  - Toe in and Toe Out

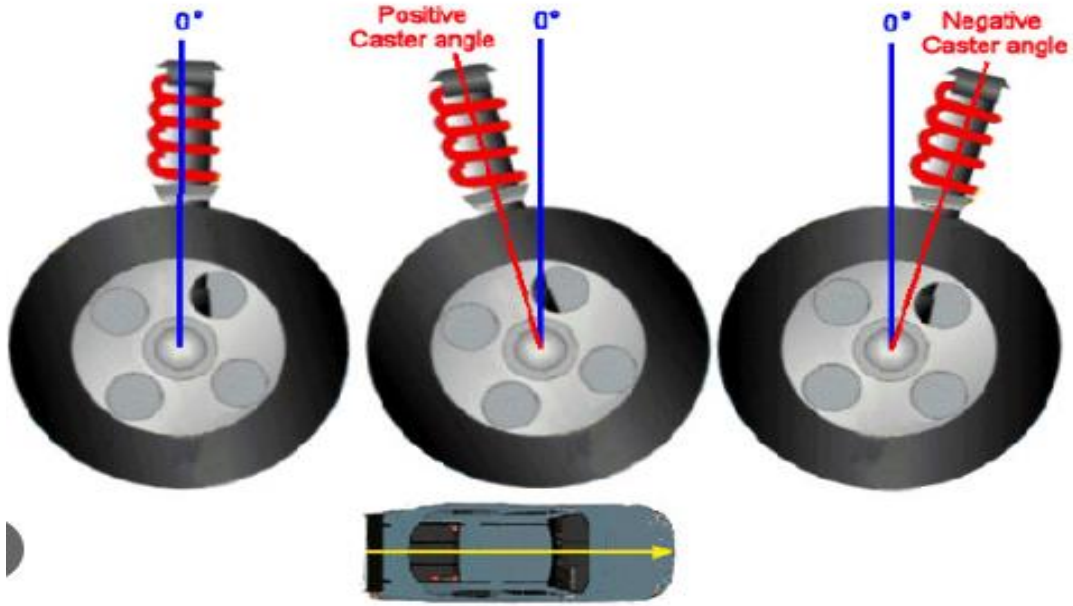
CAMBER

- Camber refers to the vertical tilt of the wheel.
- If the top of the wheel tilts outward, it's positive camber
- If it tilts inward, it's negative camber.
- Proper camber ensures even tire wear and stable handling.



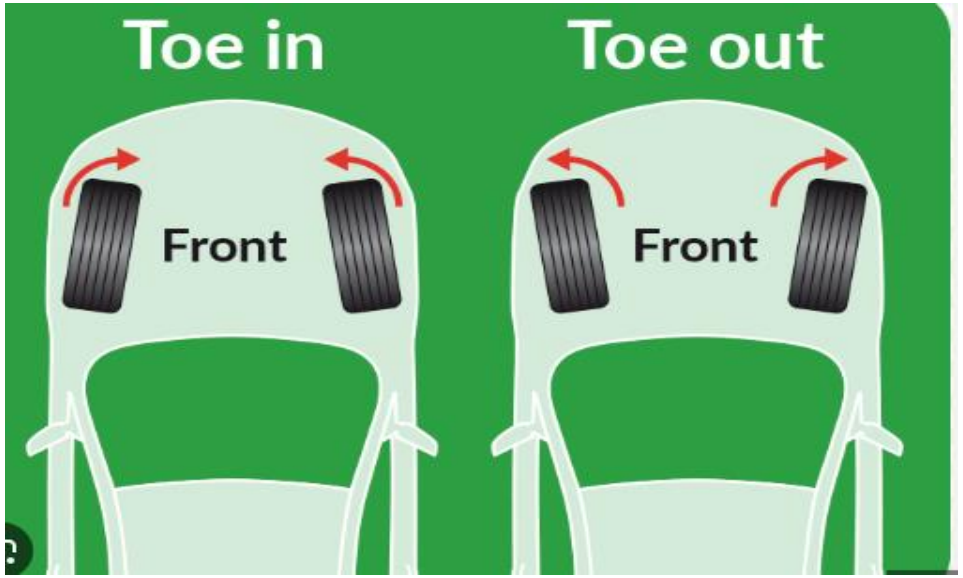
CASTER

- Caster is the angle of the steering axis when viewed from the side.
- It affects the vehicle's straight-line stability and steering feel.
- Positive caster has the steering axis tilting toward the rear of the vehicle
- While negative caster has it tilting toward the front.



TOE IN AND TOE OUT

- Toe alignment deals with the direction the wheels point concerning each other.
- When the front edges of the wheels point toward each other, it's called "toe-in.“
- When they point away from each other, it's "toe-out."
- Proper toe alignment helps maintain straight-line stability and prevents tire scrubbing.

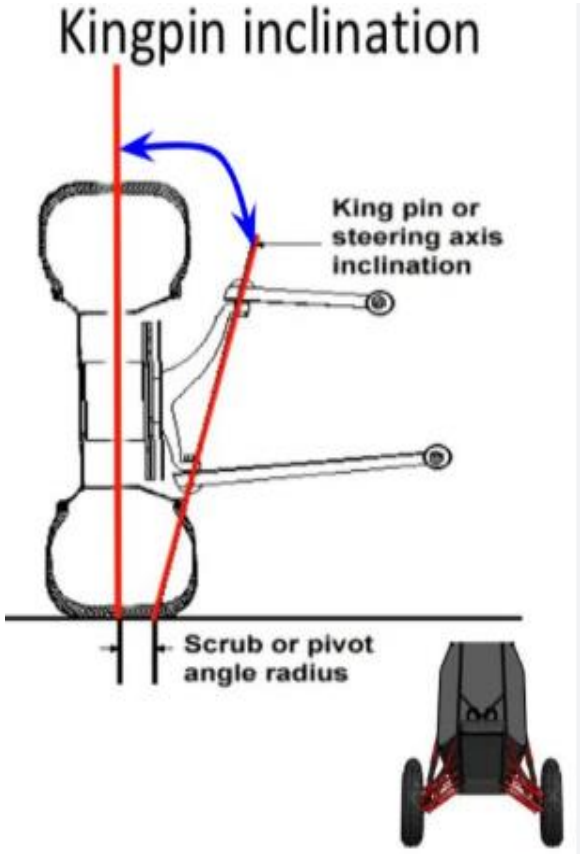


ACKERMANN ANGLE

- The Ackermann principle is a fundamental concept in steering geometry, primarily applied to vehicles with front-wheel steering systems.
- It is based on the idea that when a vehicle makes a turn, the inside wheel must have a smaller turning radius than the outside wheel to follow the curve.
- This concept ensures that all wheels trace their intended paths during a turn, resulting in stable and controlled steering

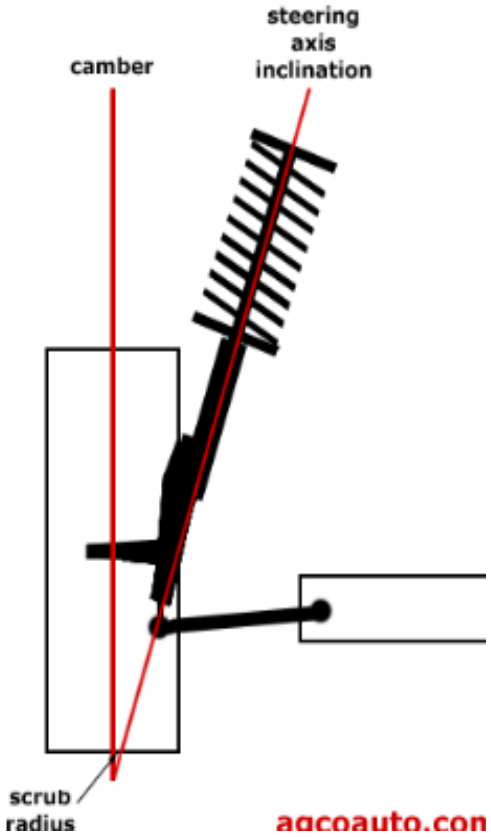
KINGPIN INCLINATION

- Kingpin inclination is the angle formed between the kingpin axis and a vertical line when viewed from the front of the vehicle.
- This angle affects steering effort, road feel, and stability.
- A more kingpin inclination typically results in lighter steering.



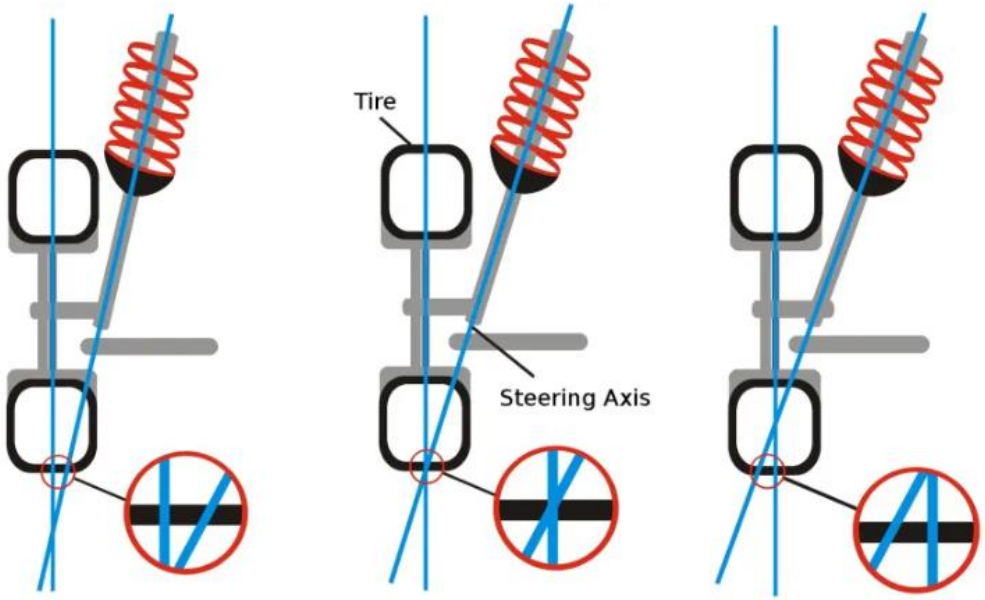
STEERING AXIS INCLINATION

- SAI is similar to kingpin inclination but is measured from the front of the vehicle.
- It provides an additional reference point for checking steering geometry and plays a role in maintaining steering stability.

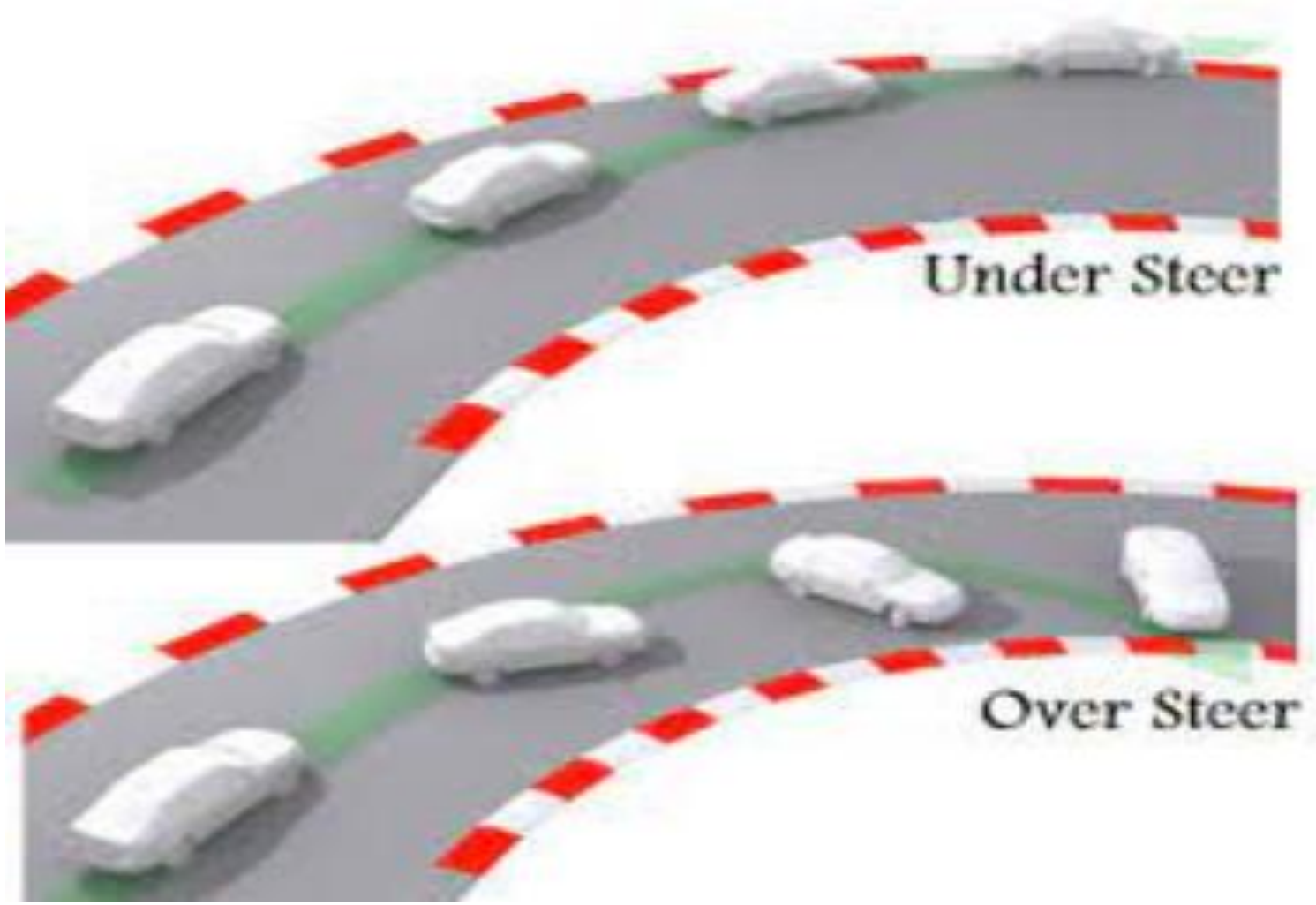


SCRUB RADIUS

- The scrub radius is the distance between the center of the tire's contact patch with the road and the point where the steering axis intersects the ground.
- The scrub radius influences steering effort, tire wear, and steering response.
- An ideal scrub radius minimizes the effort required to steer the vehicle and promotes stability.



UNDERSTEER AND OVERSTEER



THANK YOU !!!