220619D

Approach angle:

The approach angle refers to the steepest incline a mobile robot can climb without the front bumper hitting the ground. This angle is determined by drawing a tangent line from the front wheel and a line connecting the wheels to the front bumper.

Departure angle:

The departure angle is the steepest decline a mobile robot can descend without the rear bumper scraping the ground. This measurement is taken from the rear of the robot, considering the tire and bumper. When the robot's front wheel is on an incline and the rear wheel is on level ground, the robot might be hindered from moving forward, affecting its ability to climb.

Breakover angle:

The breakover angle is the sharpest angle a mobile robot can traverse over a peak without any part of its underside, except the wheels, touching the ground. This angle is measured from the center base of the robot to the front and rear wheels.

Several factors influence these angles:

1. Wheelbase and Axle Placement: Increasing the wheelbase and extending the front and rear axles outward, while maintaining the same body length, will increase the approach and departure angles. However, this adjustment can negatively impact the breakover angle.

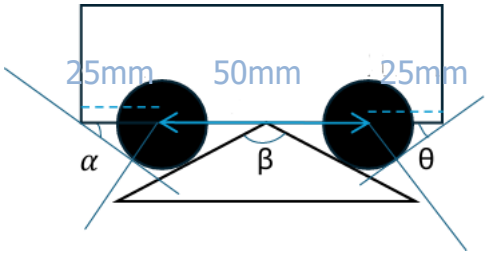
2. Suspension Height: Raising the suspension can improve all three angles but will reduce stability due to a higher center of gravity.

3. Wheel Size: Larger wheels can enhance these angles but may compromise the robot's stability and increase costs.

Calculations

Radius of wheel =15mm

Here α =θ



sin α = 15/25

α = θ = 36.87°

sin(90 - β/2) = 15/25

90-β/2 = 36.87°

β = 106.26°