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Question: Vehicles A and B are travelling toward each other in opposing...

Vehicles A and B are travelling toward each other in opposing lanes on a straight segment of a two-lane highway at 35 and 40 mi/h, respectively. If the critical rates of angular change of the two drivers are 0.0065 and 0.0055 rad/s, determine (a) which driver will be first to displace laterally and (b) the longitudinal distance between vehicles when the displacement will occur. Assume that the lateral separation between the two vehicles is 6 ft.

Expert Answer



Anonymous answered this
90 answers

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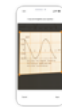
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$$\begin{aligned}
 \text{(a) Lateral displacement} &= v \times t \times \frac{0.1}{2} \\
 &= v \times t \times 0.05 \\
 &= 0.5 W v t^2
 \end{aligned}$$

Lateral displacement for vehicle A

$$\begin{aligned}
 &= 0.5 \times 0.0065 \times 35 \times t^2 \\
 &= 0.11375 t^2 \text{ (mi. sec/hr)}
 \end{aligned}$$

$$\begin{aligned}
 \text{for vehicle B} &= 0.5 \times 0.0055 \times 40 \times t^2 \\
 &= 0.11 t^2 \text{ (mi. sec/hr)}
 \end{aligned}$$

Lateral displacement of vehicle A is more than that of vehicle B.

(b) Lateral separator between the vehicles = 6 ft
width of a vehicle as per US standard is approximately = 2.44 m = 8 ft.

\therefore Lateral displacement required by a vehicle to move into the right from the opposing lane = 6 + 8 = 14 ft

\Rightarrow time by taken vehicle A to displace laterally by a distance of 14 ft.

$$\Rightarrow 0.11375 t^2 \text{ (mi. sec/hr)} = 14 \text{ feet} \quad \text{(2)}$$

$$0.1175 t^2 \text{ (5280 ft. sec / 3600)} = 14 \text{ feet}$$

$$0.1668 t^2 = 14$$

$$t = 9.1615 \text{ sec}$$

$$\Rightarrow 35 \text{ mi/hr (9.1615)} + 40 \text{ mi/hr (9.1615)}$$

$$= 35 \left(\frac{5280 \text{ ft}}{3600 \text{ sec}} \right) \times 9.1615 + 40 \left(\frac{5280 \text{ ft}}{3600} \right) \times 9.1615$$

$$= 470.29 \text{ ft} + 537.47 \text{ ft}$$

$$= 1007.76 \text{ ft}$$

$$= 0.2 \text{ miles}$$

\rightarrow at the initial condition ...

distance after the lateral displacement.

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A: [See answer](#)

Q: Please Help me !!!

A: [See answer](#)

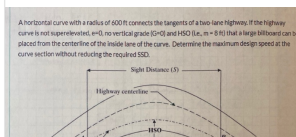
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What is the maximum allowable degree of curve (arc definition) for a two-lane highway if $e_{max} = 0.08$, $f_s = 0.12$, and the design speed

[See answer](#)

A horizontal curve with a radius of 600 ft connects the tangents of a two-lane



[See answer](#)

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Q: vehicles Bare traveling toward each other in opposing lanes on a two lane highway If critical rates of angular change of the drivers are at 35 and 40 mi/h, respectively. If the critical rates of angular change of the two drivers are 0.0065 and 0.0055 rad/s determine which driver will be the first to displace ally and (b) the longitudinal distance between vehicles when the...

A: [See answer](#)

Q: 3. Vehicles A and B are travelling toward each other in opposing lanes on a straight segment of a two-lane highway at 35 and 40 mi/h, respectively. If the critical rates of angular change of the two drivers are 0.0065 and 0.0055 rad/s, determine (a) which driver will be first to displace laterally and (b) the longitudinal distance between vehicles when the displacement will occur...

A: [See answer](#)


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