Longitudinal Control Test for Two Automated Truck Following at Crows Landing

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Test Scenarios

- Vehicle following
  - 1st Truck: Fully loaded \((M=31795[kg])\)
  - 2nd Truck: Half loaded \((M=22226[kg])\)

- Speed range tested: \(45 ~ 55[\text{mph}]\)

- Inter-vehicle distance: \(4~10[m]\)

- Flat test track with total length \(~ 2250[m]\)

- Combined braking system tested
  - Air brake (EBS) + Jake brake + Transmission retarder
  - 2nd has modified EBS Box with 0 initial value
  - 1st has default initial value for deceleration of \(0.25[m/s^2]\)
Maneuvers

1\textsuperscript{st} vehicle speed to follow a predefined profile (following a virtual vehicle)

2\textsuperscript{nd} vehicle to follow the 1\textsuperscript{st} to keep constant inter-vehicle distance

Maximum acceleration tested
\[ a=0.55 \text{ [m/(s\(^2\)]} \quad \text{when } v=2.0 \text{ [m/s]} \]
\[ a=0.24 \text{ [m/(s\(^2\)]} \quad \text{when } v=14.0 \text{ [m/s]} \]
\[ a=0.06 \text{ [m/(s\(^2\)]} \quad \text{when } v=25.0 \text{ [m/s]} \]

Maximum deceleration range tested
\[ 0.9 \text{ [m/(s\(^2\)]} \]
Test Results

Each run has 3 figures.

Units & terminologies used in the following figures:

- **spd**: Speed [mph]
- **dist**: distance
- **dist_err**: distance error [m]
- **spd_err**: speed error [m/s]

Color used in plotting:

- **red** - 1st vehicle
- **green** – 2nd vehicle
Run 1: Max speed 45 [mph] ; Des_dist: 10 [m]
Run 1: Max speed 45 [mph]; Des_dist: 10 [m]
Run 1: Max speed $45 \text{ [mph]}$; Des_dist: $10 \text{ [m]}$
Run 2: Max speed $50 \text{ [mph]}$ ; Des_dist: $10 \text{ [m]}$
Run 2: Max speed 50 [mph] ; Des_dist: 10 [m]
Run 2: Max speed 50 [mph] ; Des_dist: 10 [m]
Run 3: Max speed 55 [mph]; Des_dist: 10 [m]
Run 3: Max speed 55 [mph]; Des_dist: 10 [m]
Run 3: Max speed 55 [mph]; Des_dist: 10 [m]
Run 4: Max speed 55 [mph] ; Des_dist: 8 [m]
Run 4: Max speed $55 \text{ [mph]}$; Des_dist: $8 \text{ [m]}$
Run 4: Max speed 55 [mph] ; Des_dist: 8 [m]
Run 5: Max speed $55 \text{ [mph]}$; Des_dist: $6 \text{ [m]}$
Run 5: Max speed \textit{55 [mph]} ; Des_dist: 6 [m]
Run 5: Max speed 55 [mph] ; Des_dist: 6 [m]
Run 6: Max speed 55 [mph]; Des_dist: 4 [m]
Run 6: Max speed 55 [mph] ; Des_dist: 4 [m]
Run 6: Max speed 55 [mph]; Des_dist: 4 [m]
Run 7: Max speed 55 [mph]; Des_dist: 4 [m]; Different direction
Run 7: Max speed 55 [mph] ; Des_dist: 4 [m]; Different direction
Run 7: Max speed 55 [mph] ; Des_dist: 4 [m]; Different direction
Run 8: Max speed 55 \([mph]\); Des_dist: 3[m]
Run 8: Max speed 55 [mph] ; Des_dist: 3[m]
Run 8: Max speed 55 [mph]; Des_dist: 3[m]