

# 2

## AEBSの不要作動を確認する 試験シナリオに関する研究(続報)



自動車安全研究部

※児島 亨

岩瀬 常利

廣渡 太一

### 背景・目的

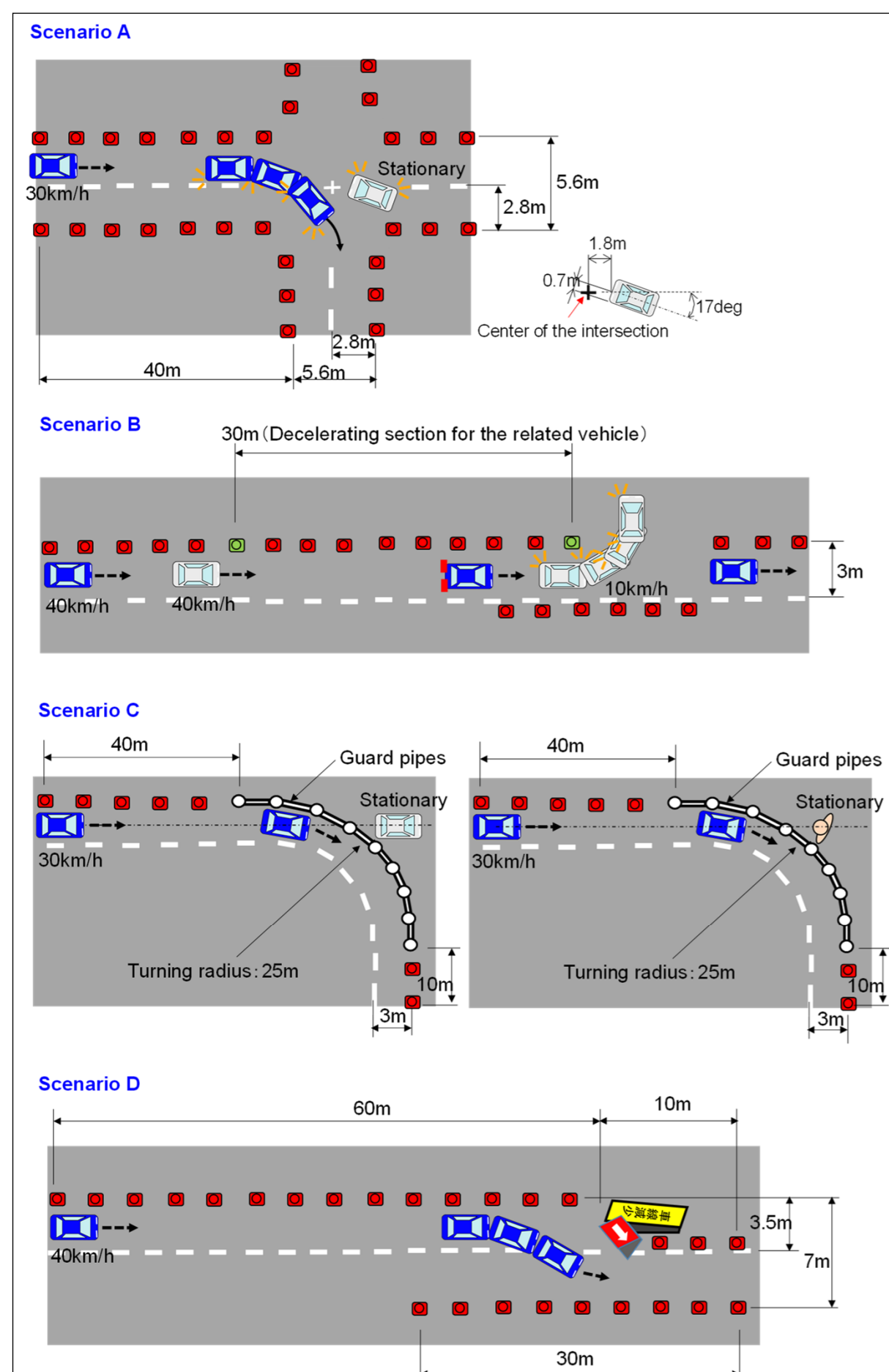
- 乗用車等の衝突被害軽減ブレーキ(Advanced Emergency Braking System、以下、AEBS)の国際基準(UN-R152)では、前方の車両及び歩行者に対して所定の性能(警報、速度低減等)を満たす規定の他、衝突の危険性が差し迫っていない状況における警報及び制動制御の作動(False reaction、以下、不要作動とする)を最小化することを規定。

⇒Annex3 Special requirements to be applied to the safety aspects of electronic control systems(電子車両制御システムの安全性に適用する特別要件) Appendix2 のシナリオを基に、審査を実施

- 現行のシナリオは極めて限定された交通場面を対象としたものであることから、当研究所では新たに複数のシナリオ案を検討し、AEBSを装備した複数の試験車両を用いて、不要作動の有無を評価
- 検討したシナリオ案及び実車評価結果について、フォーラム2019でポスター発表
- その後、当研究所において、一般ドライバーがシナリオと類似した交通場面を走行した際の運転行動を調査する実験を実施、実験結果を基に走行条件を決定

### 実験方法・実験結果

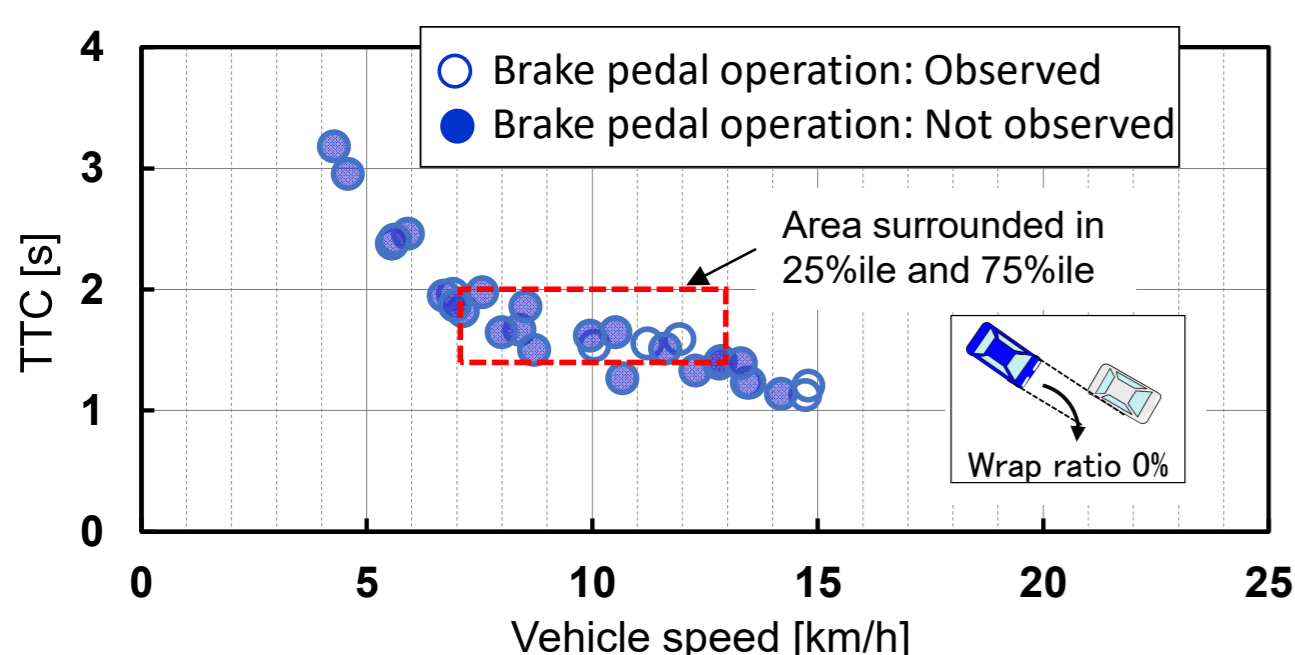
下記4つのシナリオを用いて、一般ドライバーの運転行動を計測する実験を実施



<実験協力者>  
20代~50代の男女10名

<試験車両>  
・国内メーカーの普通乗用車  
・実験中は試験車両のAEBS及びLDWS(車線逸脱警報)はOFF状態

<評価項目>  
・走行速度  
・対象物へ接近時の衝突予測時間(TTC)  
・ブレーキ操作の有無



実験結果の例(シナリオA)

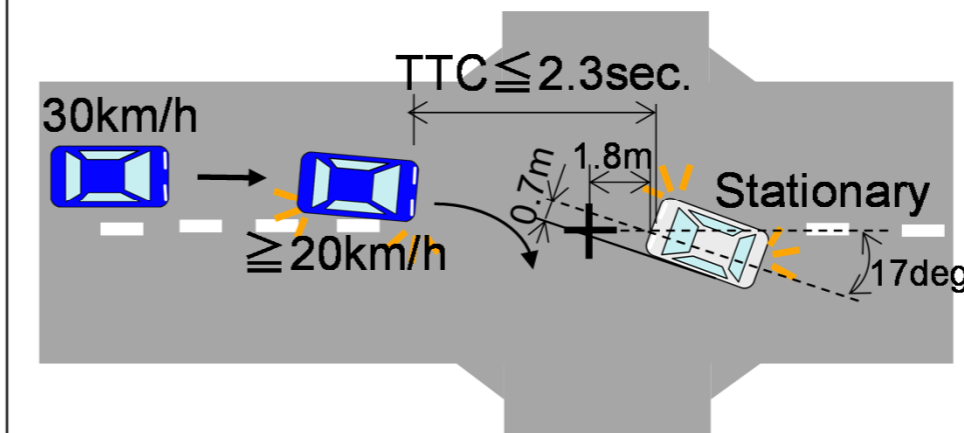
対向車線の静止車両とのラップ率が0%となった時点において、

- ・速度の25%ile値~75%ile値は7km/h~13km/hに分布
- ・TTCの25%ile値~75%ile値は1.4秒~2秒の間に分布
- ・全体の73%はブレーキ操作無し

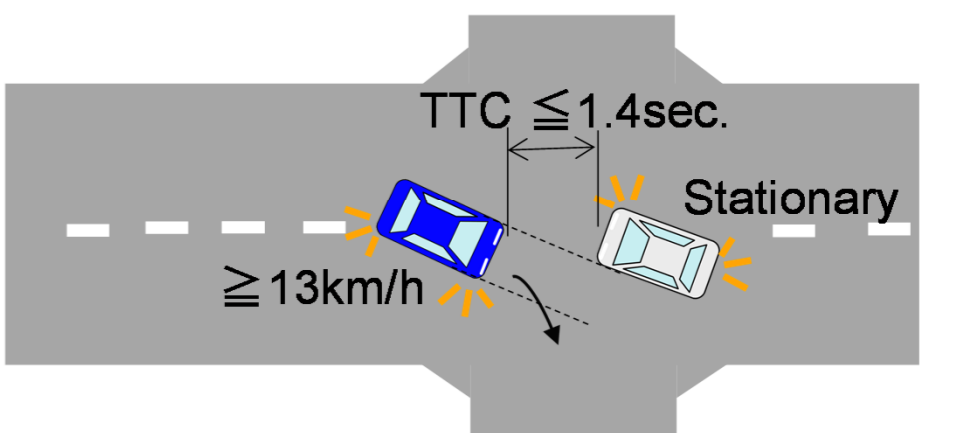
実験結果を基に、下記の4つのシナリオを完成

#### Scenario A :Right turn at the intersection

1)Beginning to steer for right turn



2)Wrap ratio 0%

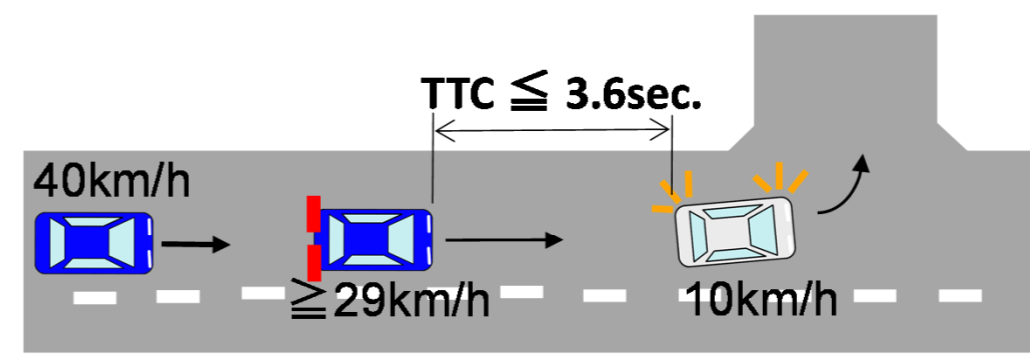


Text of scenario A

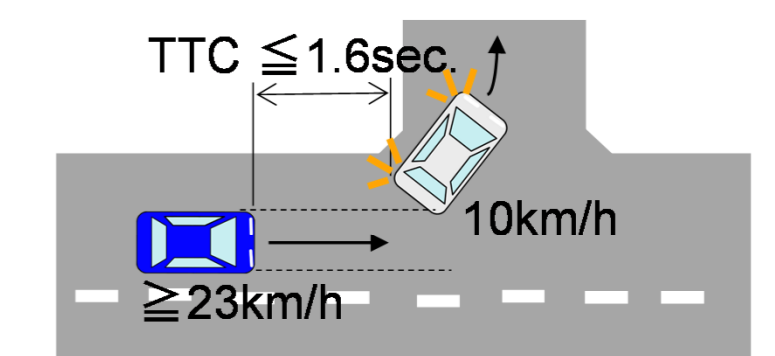
The subject vehicle drives at a speed of 30 km/h (with a tolerance of +0/-2 km/h) toward the intersection, and decelerates by braking to a speed of **not less than 20 km/h** at a point where the subject vehicle begins to steer right, and the TTC to the oncoming vehicle is **not more than 2.3 seconds**. When the subject vehicle turns right in the intersection, the speed is reduced to **not less than 13 km/h**, and then drives at a constant speed. The TTC to the oncoming vehicle is **not more than 1.4 seconds** at when the wrap ratio between the subject vehicle and the oncoming vehicle becomes 0%.

#### Scenario B :Left turn of a forward vehicle

1)Beginning of left turn (forward vehicle)



2)Wrap ratio 0%

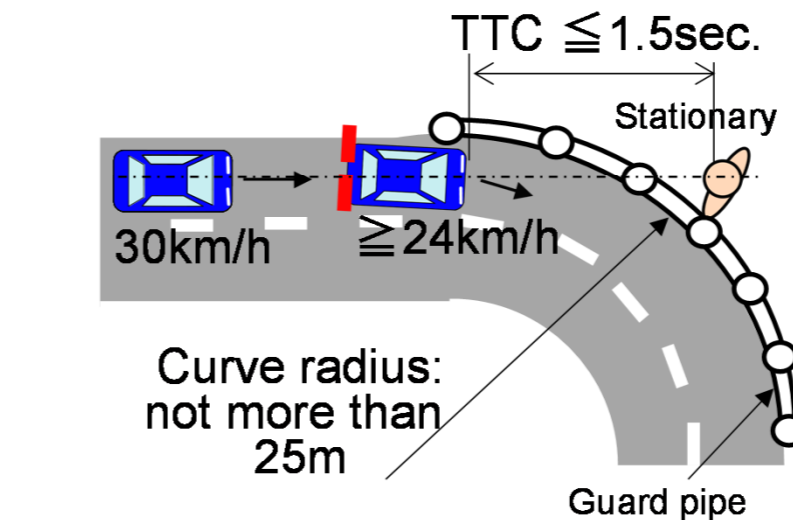


Text of scenario B

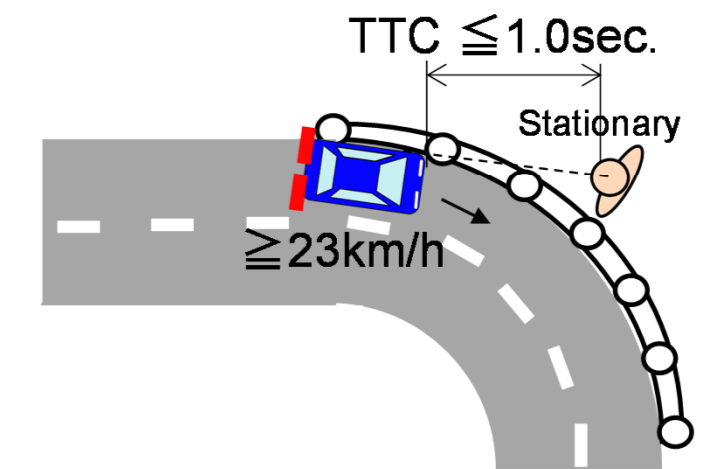
Both the forward vehicle and the subject vehicle drive at a speed of 40 km/h (with a tolerance of +0/-2 km/h) on the straight road. The forward vehicle decelerates by braking to a speed of 10 km/h (with a tolerance of +0/-2 km/h) in order to turn left at the corner, and the subject vehicle also decelerates by braking to keep appropriate distance with the forward vehicle. At when the forward vehicle begins to turn right or left, the speed of the subject vehicle is **not less than 29 km/h** and the TTC to the frontal vehicle is **not more than 3.6 seconds**. After that, the subject vehicle decelerates to a speed of **not less than 23 km/h**, and then drives at a constant speed. The TTC to the forward vehicle is **not more than 1.6 seconds** at when the wrap ratio between the subject vehicle and the oncoming vehicle becomes 0%.

#### Scenario C :Curved road with guard pipes and a stationary object

1)Beginning to steer to turn right



2) Offset ratio -100%

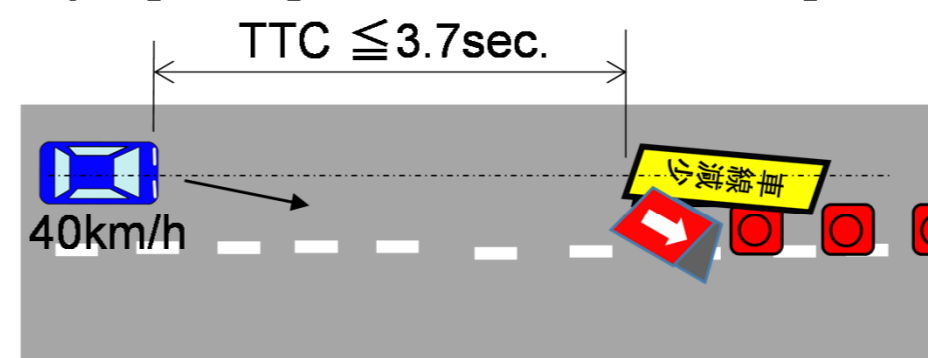


Text of scenario C

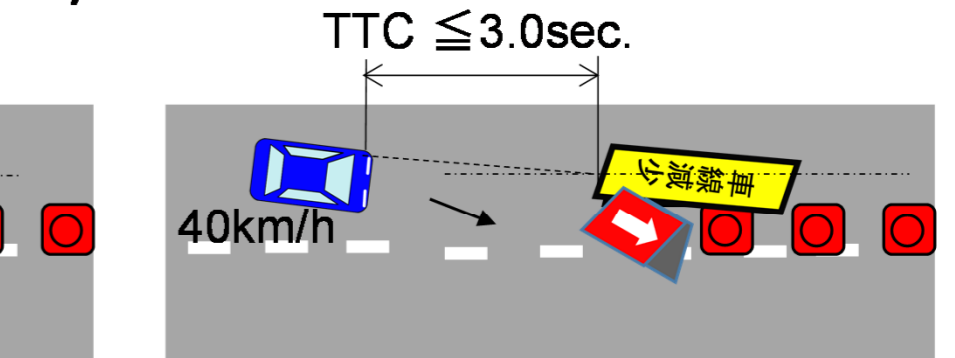
The subject vehicle drives at a speed of 30 km/h (with a tolerance of +0/-2 km/h) toward the curve of which the radius is not more than 25 m at the outer side of the road, and decelerates by braking to a speed of **not less than 24 km/h** at a point where the subject vehicle enters the curve. The TTC to the stationary vehicle or a stationary pedestrian target is **not more than 1.5 seconds** at when the subject vehicle begins to turn in the curve. In the curve, the subject vehicle drives outer lane than the centre of the road. After that, the subject vehicle continue to turn in the curve at a constant speed of **not less than 23 km/h**. The TTC to the stationary vehicle or a stationary pedestrian target is **not more than 1.0 second** at when the wrap ratio between the subject vehicle and the stationary vehicle becomes 0%, or at when the offset ratio between the subject vehicle and the centre of the pedestrian target becomes -100%.

#### Scenario D :Lane change due to road construction

1)Beginning to steer for lane change



2)Offset ratio -100%



Text of scenario D

The subject vehicle drives a straight road at a speed of 40 km/h (with a tolerance of +0/-2 km/h), and begins to steer in order to change the lane in front of the signboard which notifies reducing the lane. No other vehicles approach the subject vehicle. The TTC to the signboard is **not more than 3.7 seconds** at when the subject vehicle begins to steer. During changing the lane, **the speed of the subject vehicle is constant**, and the TTC to the signboard is **not more than 3.0 seconds** at when the offset ratio between the subject vehicle and the centre of the signboard becomes -100%.

\*改正提案では実験結果の平均値を用いることとしたため、WP.29で採択されたシナリオの速度、TTCの数値は上記とは異なる

### まとめ

4つのシナリオを基にしたR152 Annex 3、Appendix 2の改正提案\*が第183回国連自動車基準調和世界フォーラム(WP.29)にて採択された。