

Advanced Emergency Braking System

Justification for EVSC as Obligation (illustrated on Kamm's Circle)

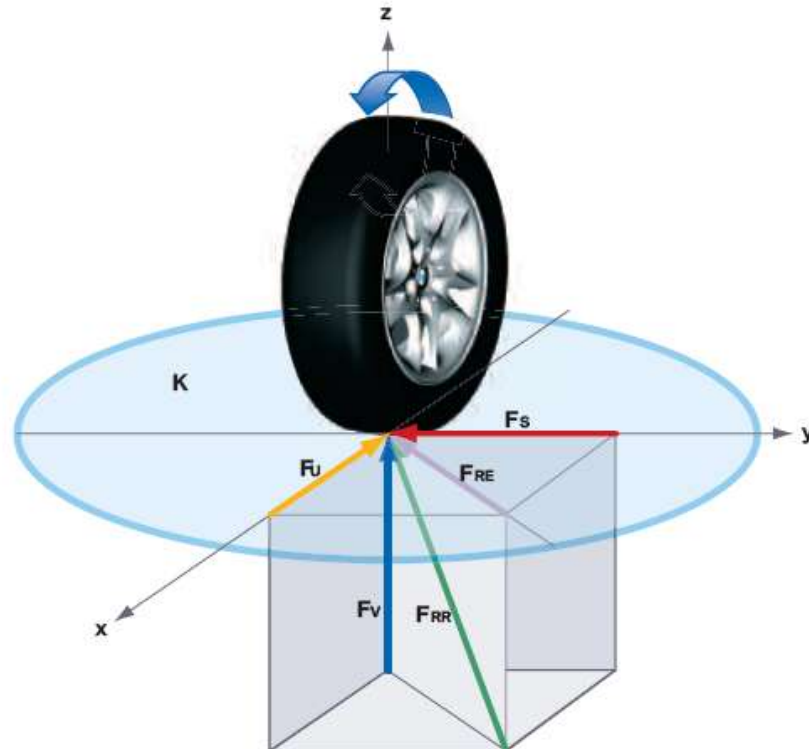


AEBS/LDWS-11-17
20110126



AEBS: Necessity of EVSC equipment

Forces at wheel



Index	Explanation	Index	Explanation
K	Kamm's circle	F_V	Vertical tire force
F_U	Tangential tire force	F_{RE}	Resulting force on surface
F_S	Lateral tire force	F_{RR}	Resulting force in space

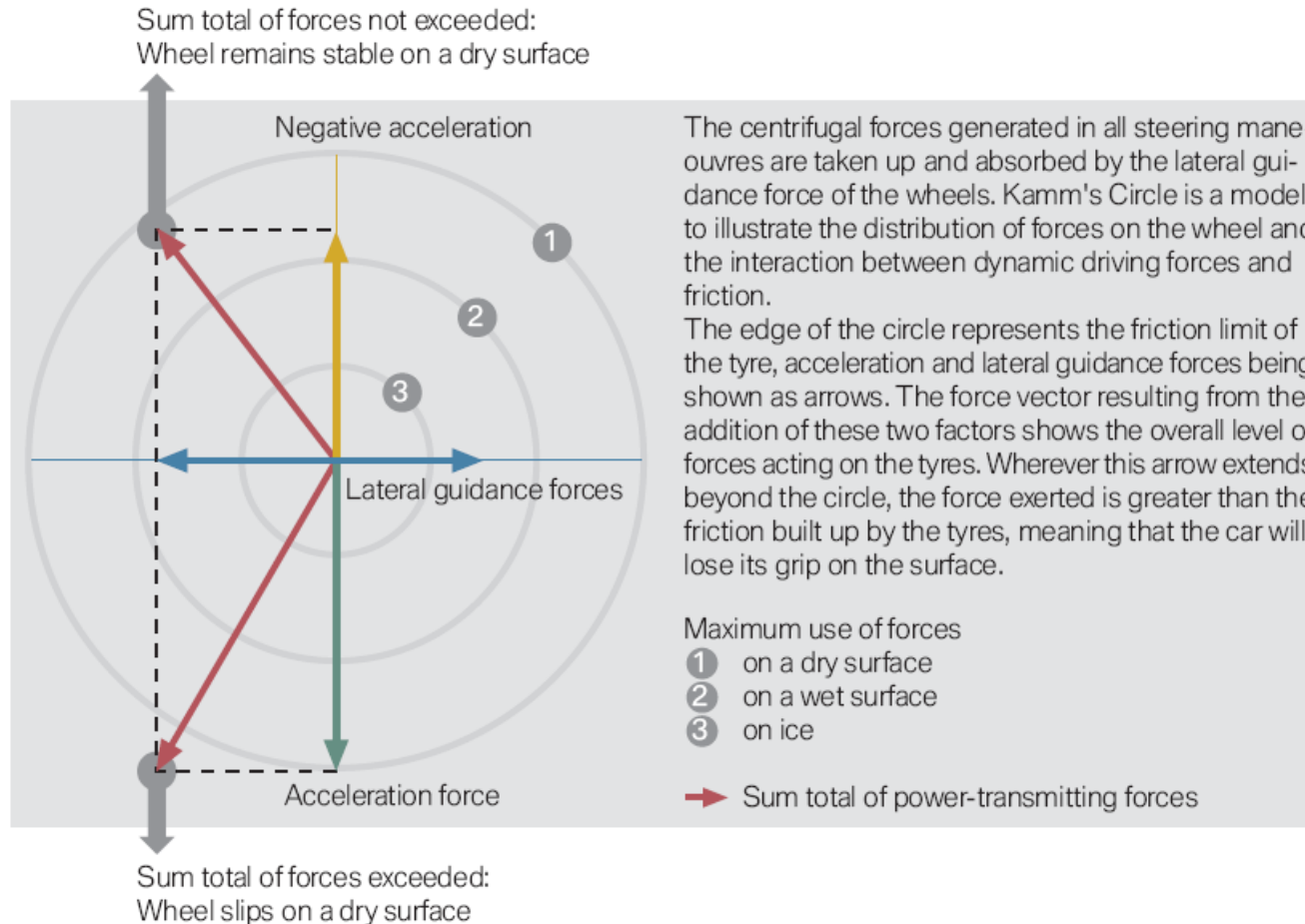
Source: BMW Group

AEBS: Necessity of EVSC equipment

Influence of combined forces



Kamm's Circle.






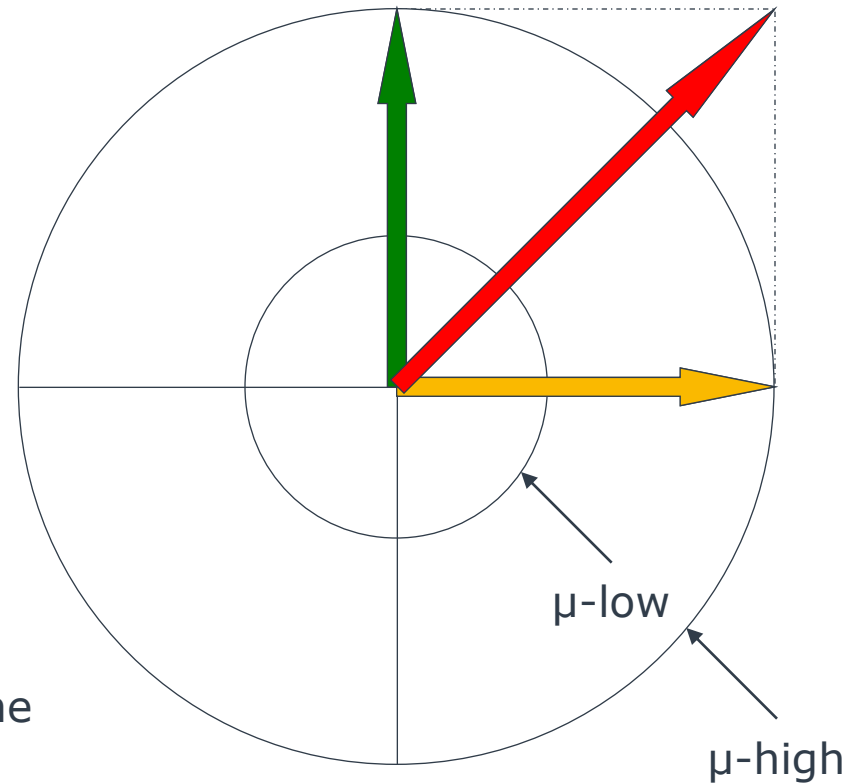
Source: BMW Group

AEBS: Necessity of EVSC equipment

Influence of combined forces



-  only lateral forces
→ vehicle controllable
-  only forces based on deceleration
→ vehicle controllable
-  resultant force extends beyond the friction threshold (outer circle)
→ vehicle under instable conditions



AEBS: Necessity of EVSC equipment

Influences of EVSC



AEBS/LDWS-11-17
20110126



resultant force inside of thresholds

→ vehicle controlled by EVSC

Justifications supporting EVSC

- Where ABS simply brakes the wheels such to avoid wheel locking, the EVSC is able to brake the wheels separately to turn an unstable situation into a stable situation.
- Where an ABS simply decelerates the vehicle, the EVSC is able to reduce the yaw rate and hence increase the vehicle stability
- Where an ABS simply brakes the wheels “blindly” of a tractor/trailer combination, the EVSC is able to improve combination stability by “stretching” the combination
- Vehicles fitted with only AEBS + ABS could fulfil the AEBS requirements in the approval test conditions, but would decrease the vehicle stability when trying to achieve the same performances in emergency conditions in the real world. Vehicles fitted with AEBS + ABS + EVSC could mitigate the braking distances in emergency conditions in the real world but would improve the vehicle stability hence avoid additional danger to the other road users (jack-knife and roll-over are avoided).

