The Lateral Displacement Measured by GPS Compared with Other Methods

1. Contents of Study :

- Comparison of lateral displacement of Sine with dwell test measured/calculated by

  A ; GPS system

  B ; Vx, Vy measured by optical sensor

  C ; $\int \int a_{y\,C.G.}\, dt$ (as defined in the regulation)

- GPS systems : (the detail of specification; refer to the Appendix)

Table 1 : Specification of GPS system

	Manufacture:A	Manufacture:B
Make	Oxford Technical Solutions	Racelogic
Model	RT3002	VBOX 2 SX
Positioning	L1/L2 Kinematic	DGPS
Accuracy	2 cm	20 cm
Resolution	————	1 cm
Sampling f	100 Hz	20 Hz

The Lateral Displacement Measured by GPS Compared with Other Methods

2. Test Procedure :
   - Test Procedure : Sine with dwell test
   - Vehicle speed : 80 km/h
   - Lateral Displacement : 1.07 sec. after steer-in
   - Test vehicles :

		Manufacture A	Manufacture B
Engine		RWD 4.6L V8	RWD 3.5L V6
Wheelbase [m]		2.970	2.650
Weight [Kg]	FR	1126	903
	RR	1042	784
Tire	FR	245/45R19	225/45R18
	RR	245/45R19	245/45R18

The Lateral Displacement Measured by GPS Compared with Other Methods

3. Test Results (1)

5.0 x (0.3 G Steering Wheel Angle (SWA))

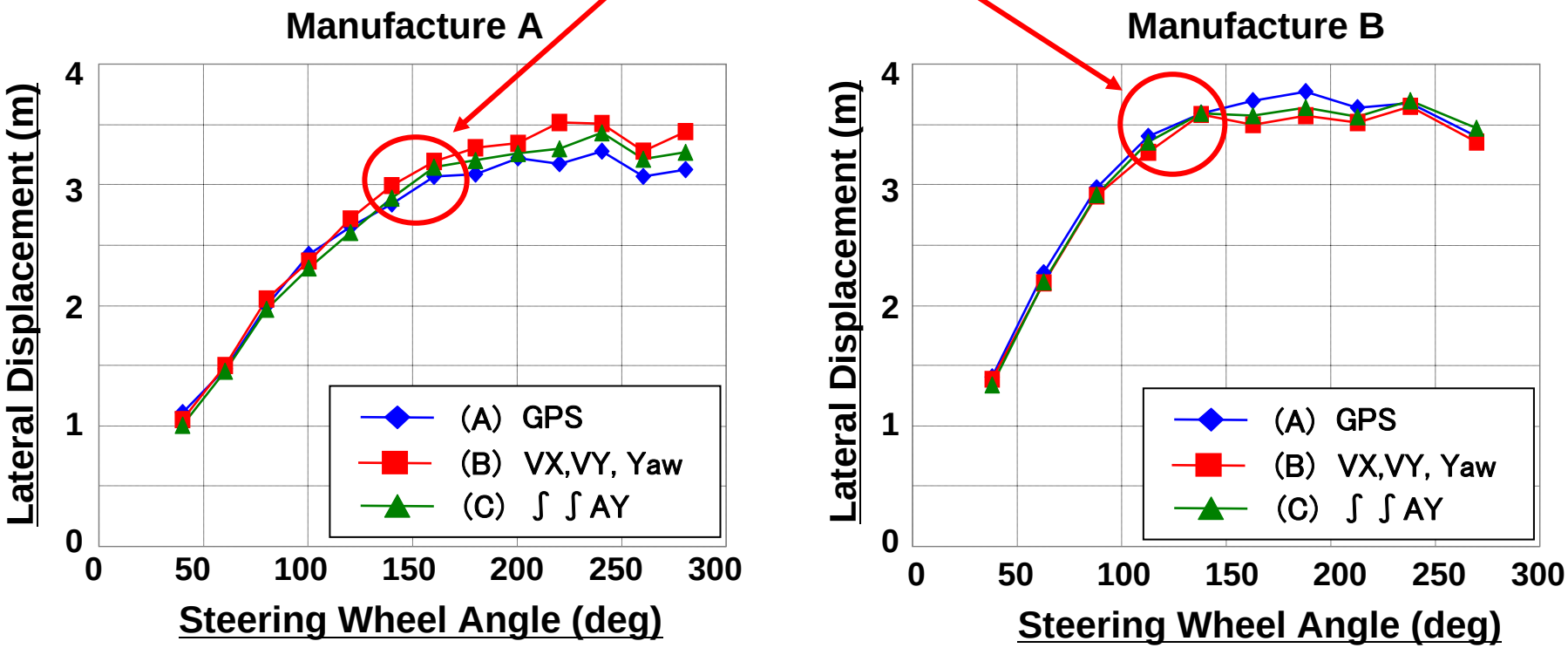

Fig.1 Lateral displacement of Sine with dwell test (at 1.07 sec)

The Lateral Displacement Measured by GPS Compared with Other Methods

3. Test Results (2)

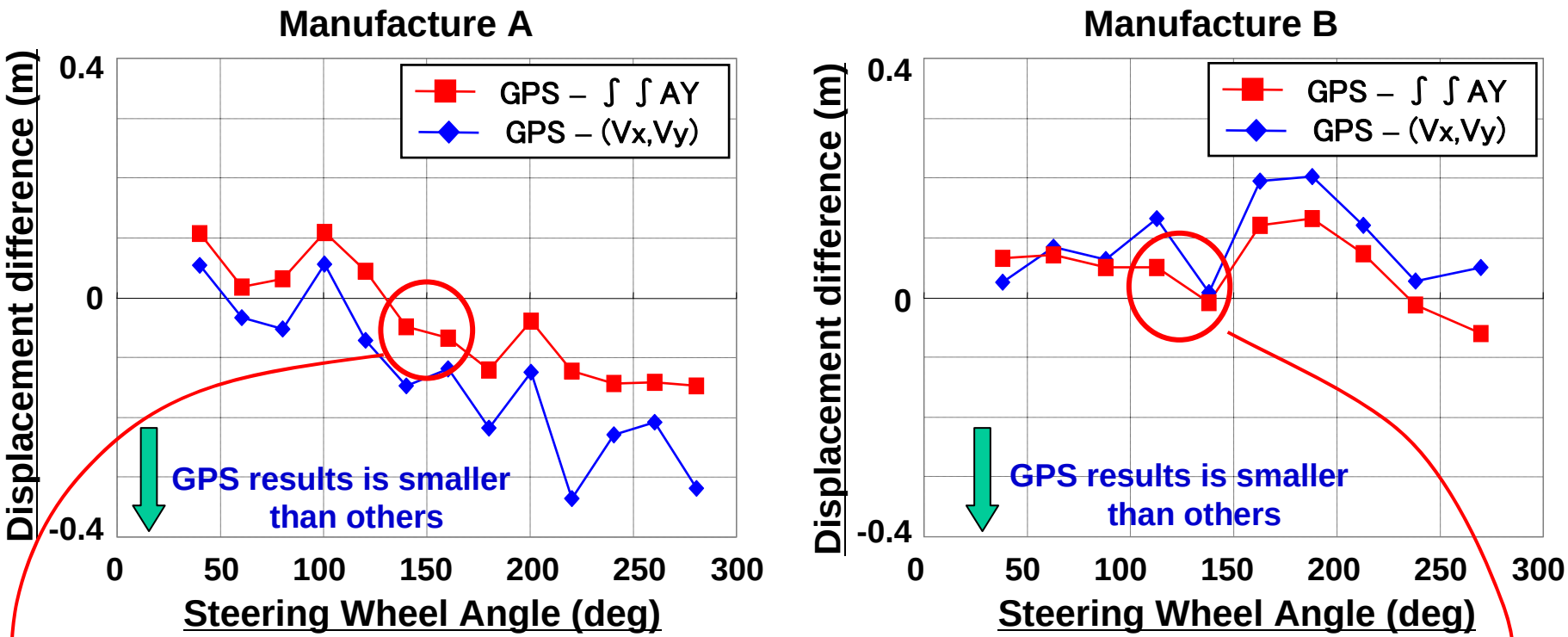

Fig. 2 Comparison of lateral displacement between GPS result and others

Difference between GPS results and double integral of Ay at 5.0x(0.3g SWA)

-5 ~ -7 cm (-1.7 ~ -2.2 %)

0 ~ +5 cm (0 ~ +1.5 %)

The Lateral Displacement Measured by GPS Compared with Other Methods

4. Conclusion

GPS system can be allowed as the alternative measuring method for type approval testing provided the manufacture shows the evidence of their GPS system data equivalent with double integral of Ay.

5. Reference

1) The difference between GPS results and double integral of Ay at 5.0x(0.3g SWA) can be considered as equivalent for both GPS systems.

2) The tendency of the difference was observed between GPS result and others depends on the model of GPS system.