

Mysteries of Interpolation(IP) Method

New Issues TF

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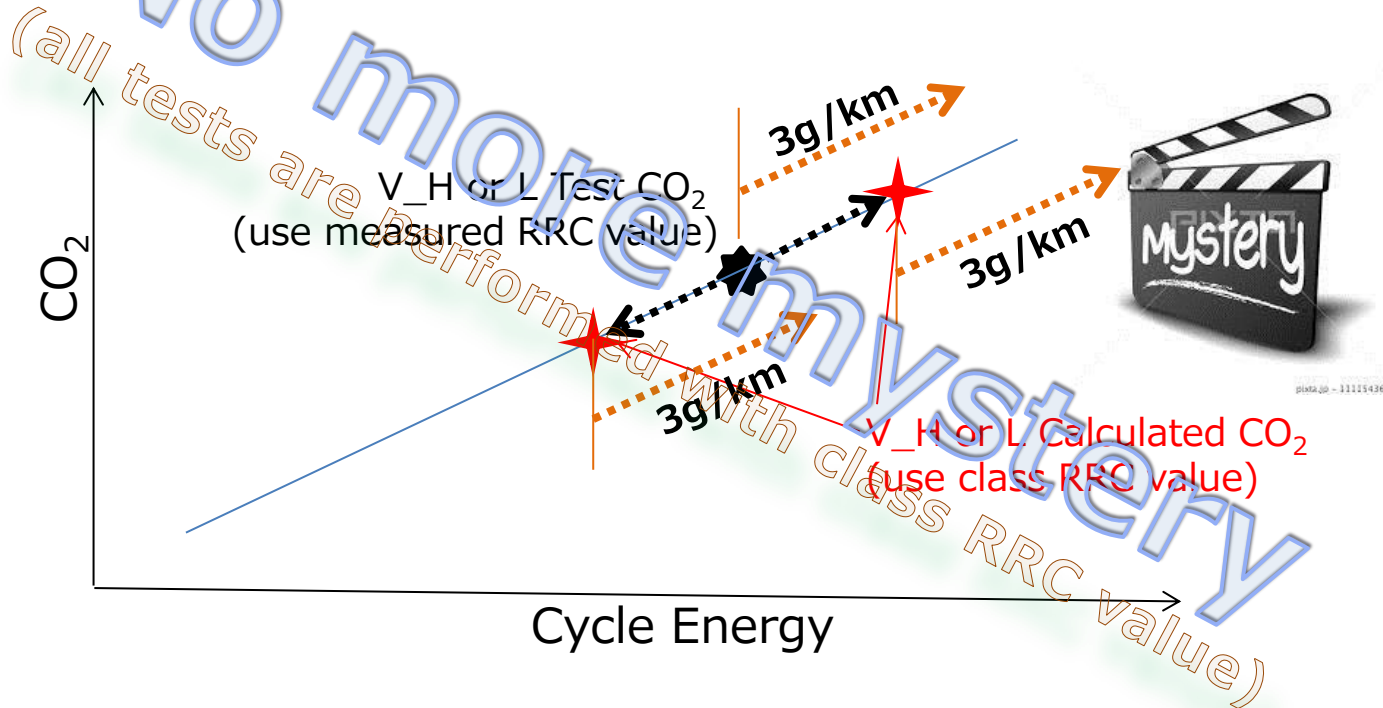


Mystery #1 ; NO Consistency of Tyre RRC

Possible configurations		RRC		
		Vehicle_H	Individual vehicle	Vehicle_L
1. do not apply IP method		measured value	NA	NA
2. apply IP method	2-1. Same tyre within IPF	class value		
	2-2. Same tyre on vehicle_H and _L but different tyre on individual vehicle			
	2-3. Different tyre on vehicle_H and _L			

ACTION : make GTR more clear to have same interpretation

Mystery #2 ; 3g/km Extension from Cal. ? or Test CO₂ value ?



Mystery #3 ; how to develop f_0 and f_2 with fixed f_1 ?

GTR describes “applying the least squares regression method” (Annex7 3.2.3.2.2.4), however this method may be unpractical. (2nd order regression with fixed 1st order coefficient ?)

$$F_{VH} = f_{0,H} + f_{1,H} \times v + f_{2,H} \times v^2$$

$$F_{VL} = f_{0,L} + f_{1,L} \times v + f_{2,L} \times v^2$$

↓
 $f_{1,H}$



Mystery #4 ; adjusted $f_{0,L}$ and/or $f_{2,L}$ are bigger than $f_{0,H}$ and/or $f_{2,H}$?

→ Concept of IP method is collapsed !!!

Manufacture_A

Re-run the road-load test until $f_{0,H}$ and/or $f_{2,H}$ are bigger than $f_{0,L}$ and/or $f_{2,L}$?

Are there any good practical suggestions to eliminate such a ridiculous re-tests ?



Mystery #5 ; Huge Error when adjust $f_{1,L}$ to $f_{1,H}$

3.2.3.2.2.4. Calculation of road load for individual vehicles

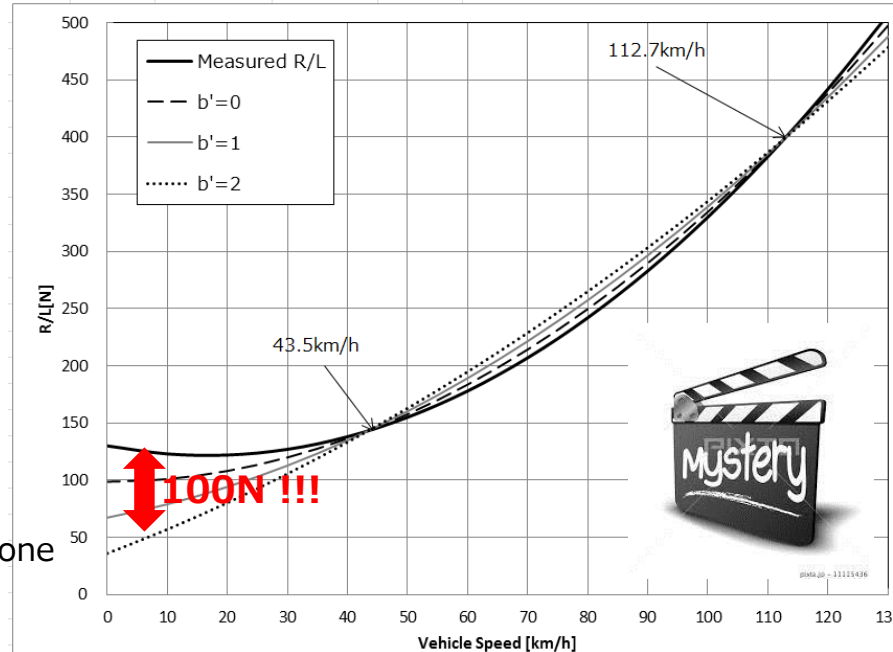
Possible f_1 variability of same type of vehicle configurations

Model	A	B	C	D	E	F	G	F
AVE	0.3958	0.2974	0.1847	-0.2831	-0.0146	-0.1222	0.2906	0.8777
MAX	0.5976	0.4073	0.3185	0.0198	0.3117	0.2539	0.9802	1.0563
MIN	0.2013	0.0730	-0.0304	-0.5555	-0.1587	-0.4968	-0.0001	0.5113
MAX-MIN	0.3963	0.3343	0.3489	0.5753	0.4704	0.7507	0.9803	0.5450
σ	0.1545	0.1400	0.1499	0.2376	0.2191	0.3108	0.4621	0.2475
3 σ 片側	0.4635	0.4201	0.4496	0.7127	0.6574	0.9324	1.3863	0.7426
$\pm 3\sigma$ 両側	0.9269	0.8403	0.8992	1.4254	1.3147	1.8648	2.7726	1.4853

case study

R/L	measured R/L	b'=0	b'=1	b'=2	
$f_{2,L}$	a=	0.03000	0.02360	0.01720	0.01080
$f_{1,L}$	b=	-1.0000	0.0000	1.0000	2.0000
$f_{0,L}$	c=	130.0	98.63	67.3	35.9

$= f_{1,H}$



However, cycle energy demand is almost identical to original one
 → calculated individual vehicle CO₂ is OK. **BUT**

Complicated!! but NECESSARY !!

STEP1 : change $f_{1,L}$ to $f_{1,H}$ and derive new $f_{0,L}^*$ and $f_{2,L}^*$ (follow GTR)

STEP2 : calculate cycle energy demand of V_H or V_L (follow GTR)

In case that physical test is conducted on the individual vehicle and

if [*****],

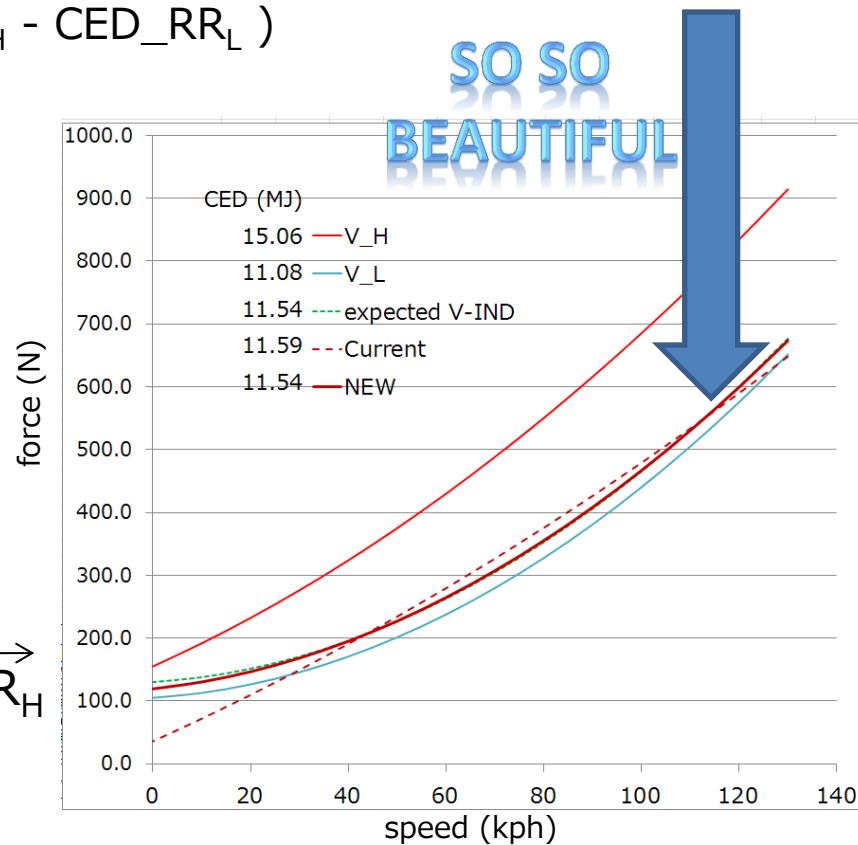
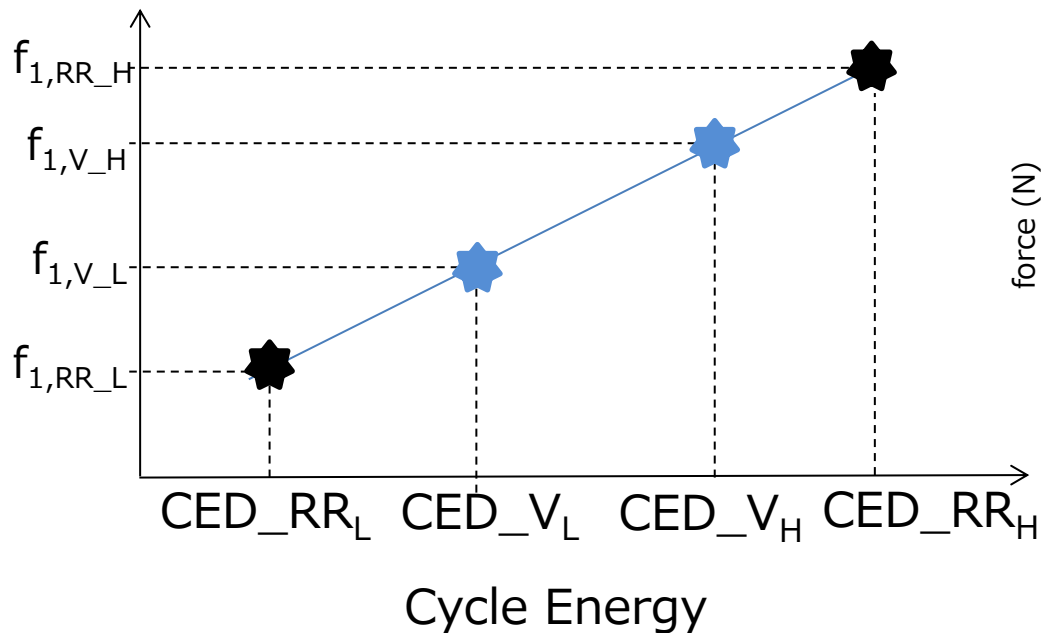
<< applicable threshold is under the discussion (or option) >>

STEP3 : re-adjust $f_{1,V_H \text{ or } L}$ according to the next slide formula

STEP4 : then derive f_0 , f_2 and run the test

STEP5 : for CO_2 determination, cycle energy demand shall be calculated by using original $f_{0,1,2}$ to avoid unnecessary burden.

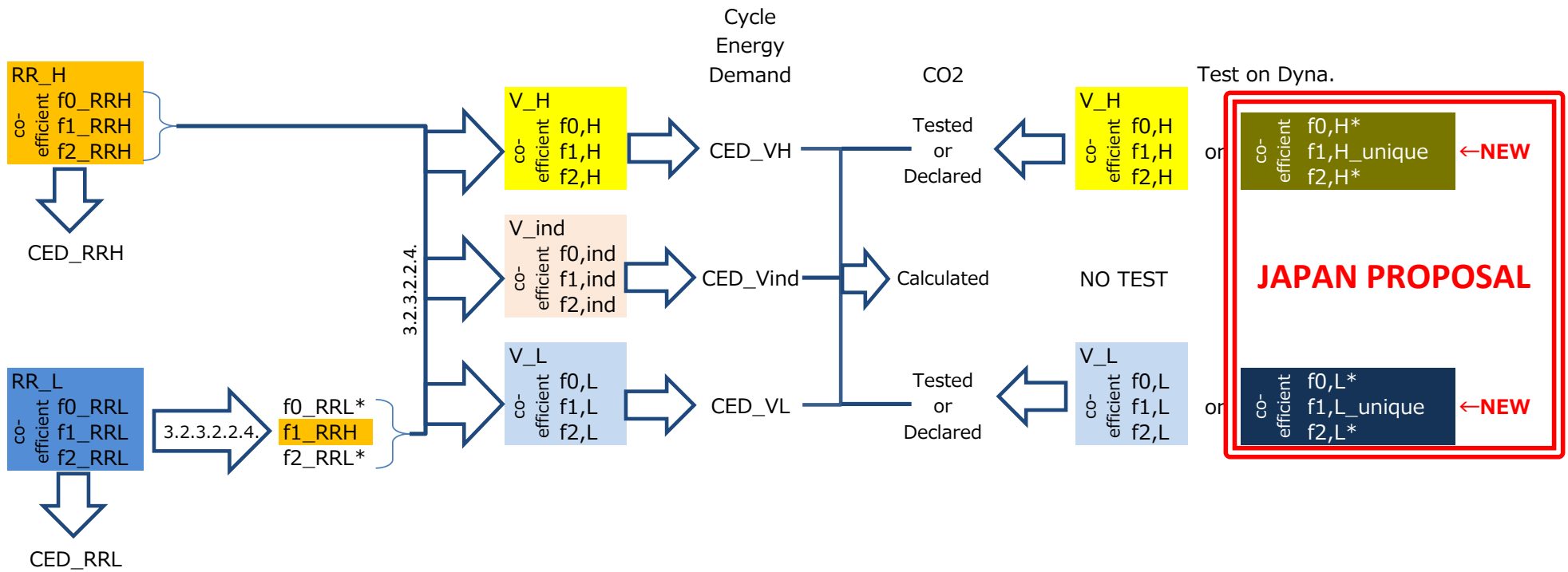
$$f_{1,V_H\ or\ L} = \frac{(CED_V_{H\ or\ L} - CED_RR_L) * f_{1,RR_H} + (CED_RR_H - CED_V_{H\ or\ L}) * f_{1,RR_L}}{(CED_RR_H - CED_RR_L)}$$



Procedure to solve IPM Mystery#5

Road-Load Family

Interpolation Family



AOM ?

(Any other MYSTERIES)

1. Application document is going to be mess when 1 IP family divide into 2 IP families due to range restriction
2.
3.