ADVANCED AIRPORT PAVEMENT DESIGN AND EVALUATION METHOD

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Serviceability (PCCP)

- Subgrade/Subbase Deformation
- Flexural Fatigue Cracking
- Riding Comfort
- Traveling Safety

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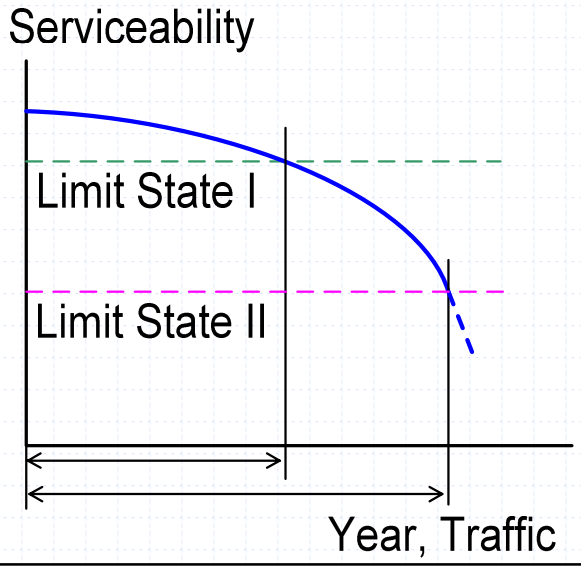
Performance of Pavements



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Requirements for Airport Pavement Performance

- Bearing Capacity
  - Large Mass: 400t (B747), 600t (NLA)
- Safety in Operation
  - High speed: 300km/h (at landing)

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Runway Roughness Evaluation from Aircraft Operation

- Questionnaire to Pilots
- Simulation of Aircraft Response
- Criteria on Roughness

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Questionnaire to Pilots

- 3 Airlines, 84 pilots
- Facility Condition Evaluation
  - R/W, T/W, A/P
- Surface Distress Influence to Evaluation
  - Faulting, Rutting, Cracking, Scattered Debris , Longitudinal Gradient, Transverse Gradient, Water Film, Snow & Ice, Centerline Light
- Serviceability
  - Riding Comfort, Safety in Operation

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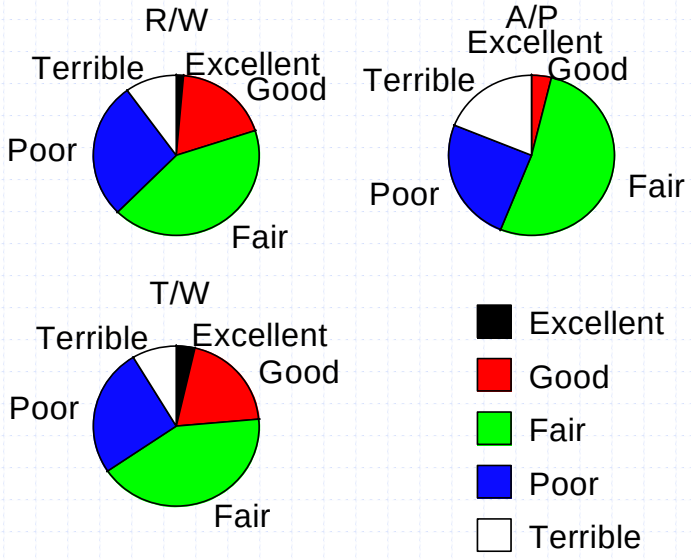
Evaluation: Riding Comfort



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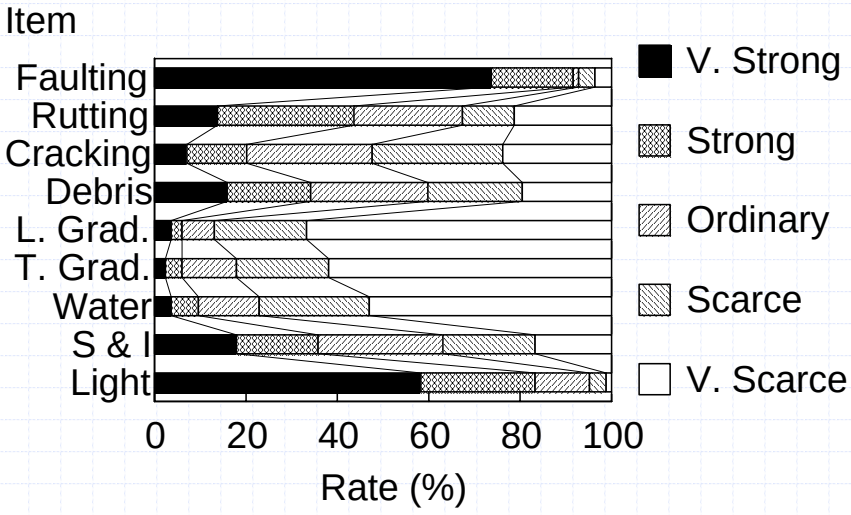
Influence of Item to Comfort



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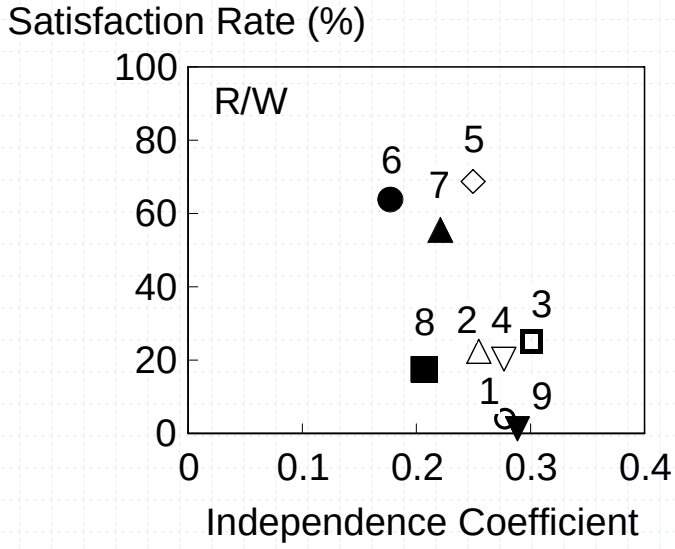
Improvement of Comfort



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Items Necessary to Improve

Item	Comfort			Safety		
	R/W	T/W	A/P	R/W	T/W	A/P
Faulting	10.9	-2.9	14.0	19.7	-6.7	-5.6
Rutting	2.5	2.2	7.7	8.8	-8.6	-6.7
Cracking	7.7	6.3	2.9	6.2	2.1	-11.6
Debris	6.7	1.5	-0.5	3.1	4.3	-7.8
L. Grad.	-7.6	-2.9	-27.0	6.2	0.0	-7.5
T. Grad.	-19.8	-2.1	-1.6	0.9	-0.7	-1.9
Water	-10.9	-11.8	-11.9	-3.5	2.7	-7.0
S & I	-2.5	10.1	-5.7	25.1	2.0	-8.6
Light	13.8	15.7	13.5	3.6	3.5	-14.0

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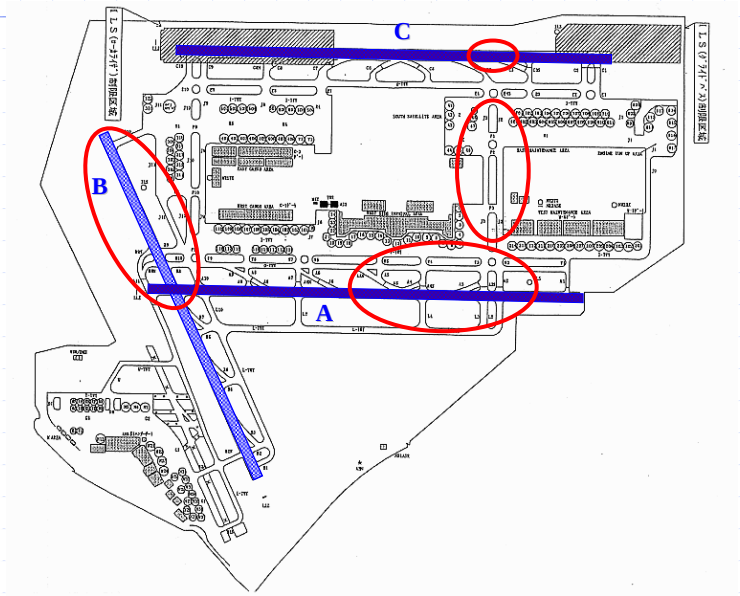
Pilot's Evaluation at TIA



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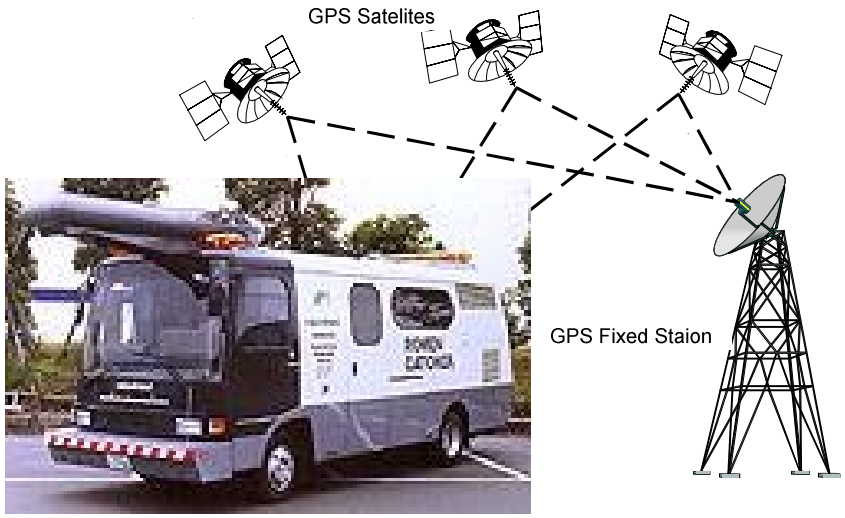
Longitudinal Profile Measuring System



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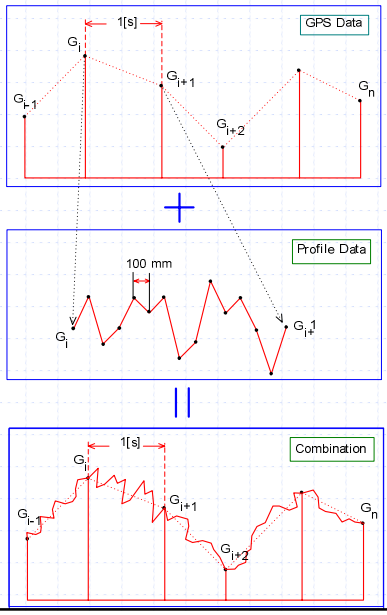
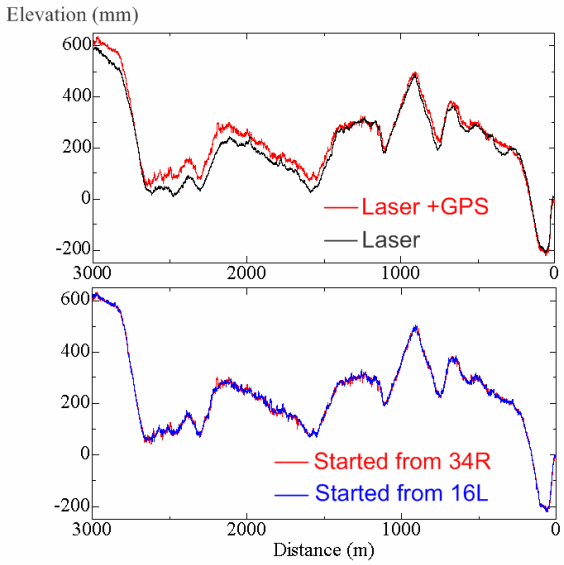
Laser Profilometer + GPS

- Method
  - LP: Shorter
  - GPS: Longer
- Speed
  - 0~65km/h
- Accuracy
  - Less than ±1.2mm
- Interval
  - 1mm or longer



Measured Results



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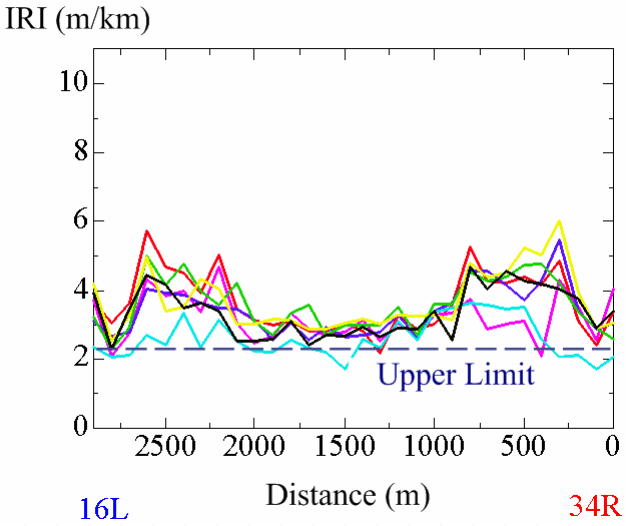
Evaluation Based on IRI



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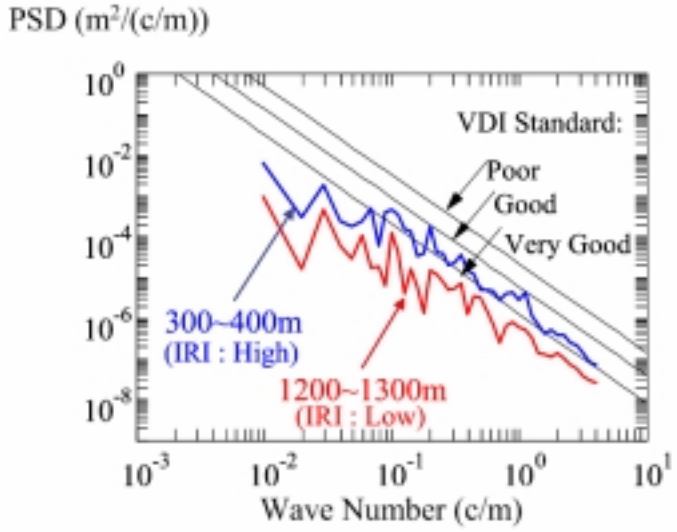
Evaluation Based on PSD



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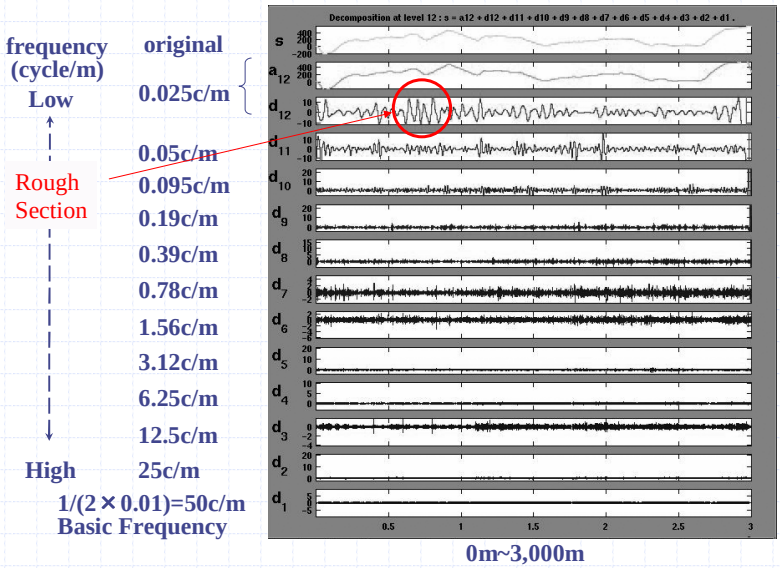
Evaluation by Wavelet Analysis



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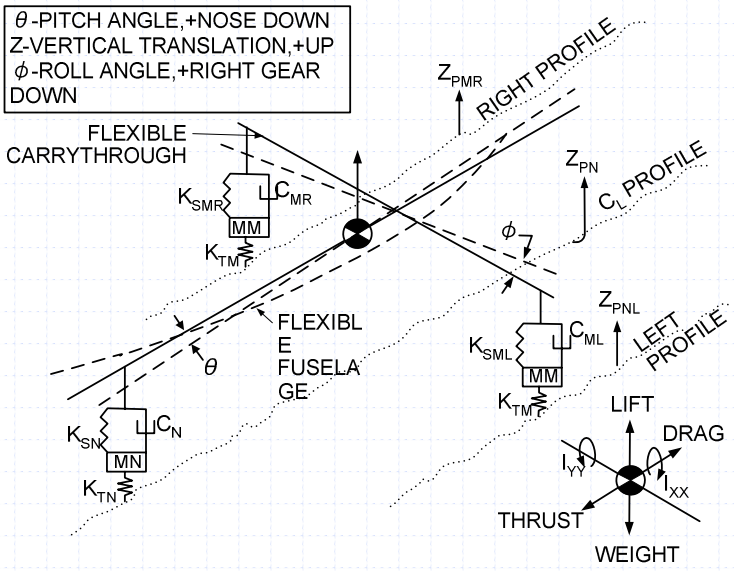
Aircraft Response Model



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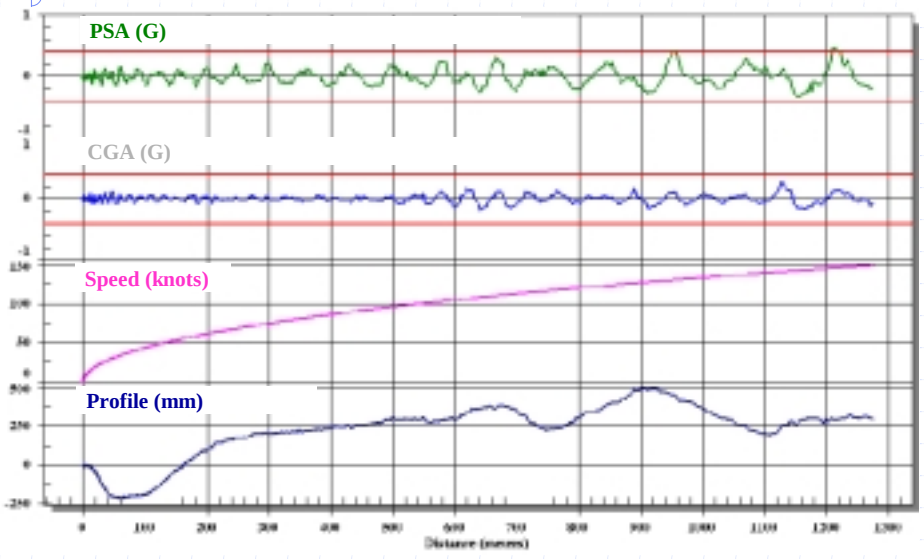
Simulation for TIN



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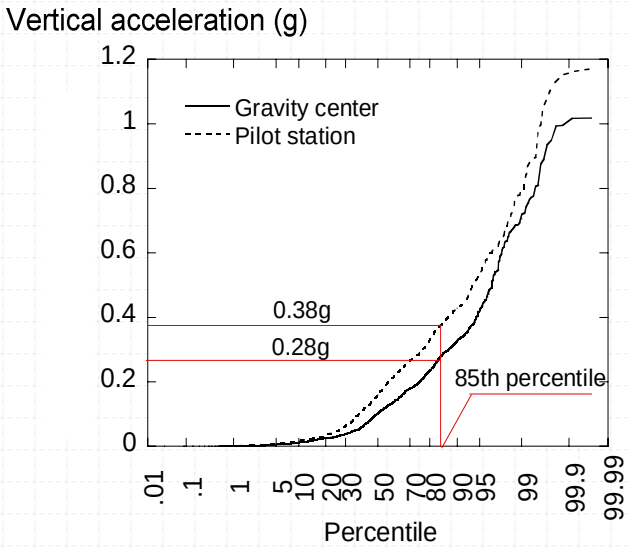
Design Acceleration



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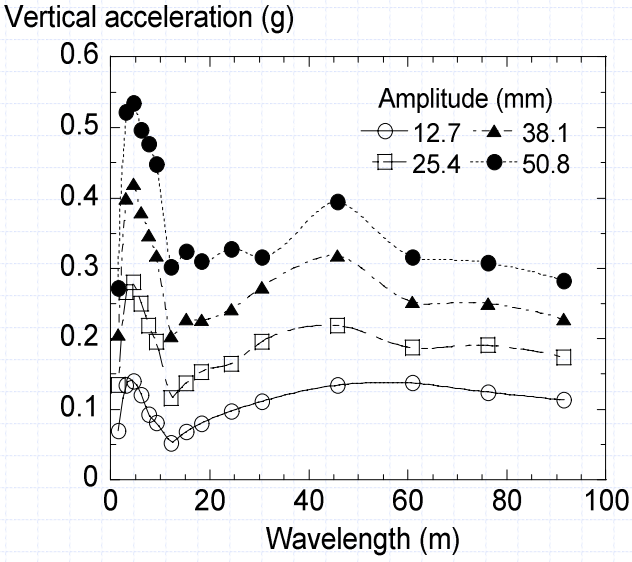
Acceleration at CG: Takeoff



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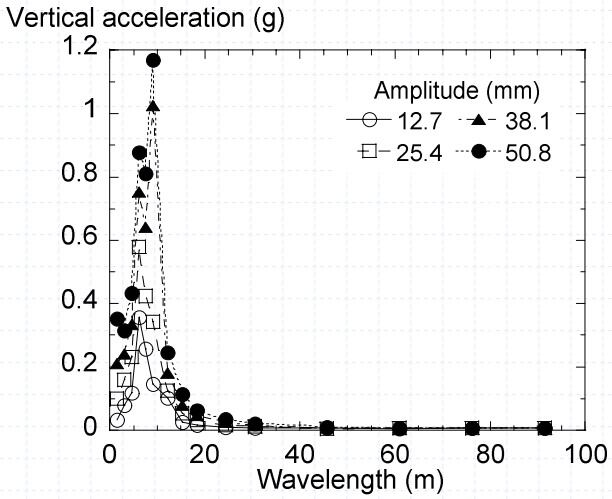
Acceleration at CG: Taxiing



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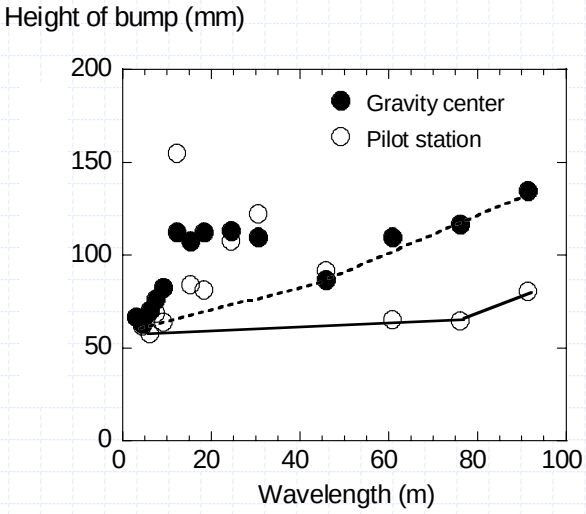
Bump Criteria: Takeoff



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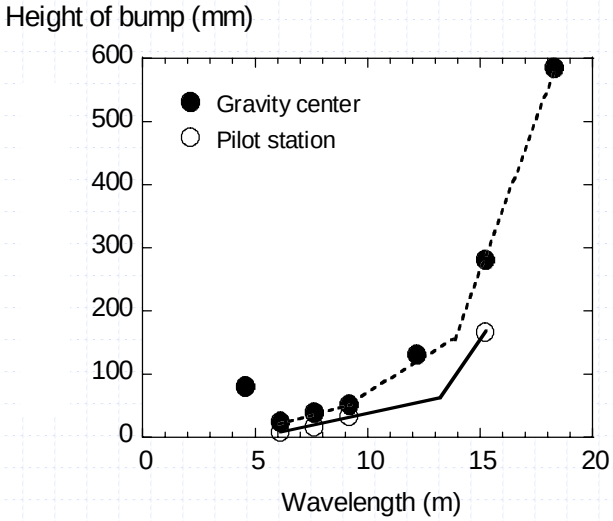
Bump Criteria: Taxiing



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Conclusion

- Pilots' Evaluation
  - Satisfied with Present (60 - 70%)
  - Comfort: Center Light, Faulting
  - Safety: Snow & Ice, Debris
- Aircraft Vertical Acceleration
  - Influenced by Speed, Position in Aircraft
- Bump Criteria
  - 50mm (Takeoff)
  - 10mm (5 - 15m Wavelength, Taxiing)

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