Development of a Simple Near-Ground Path Loss Model Verified by Measurements

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1st Semester WCS

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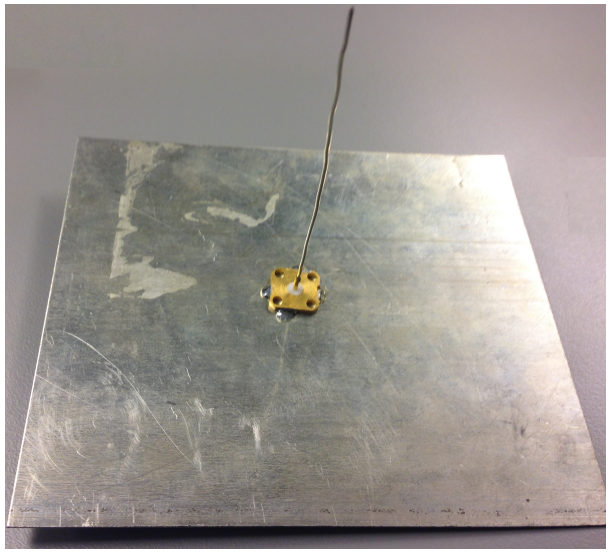
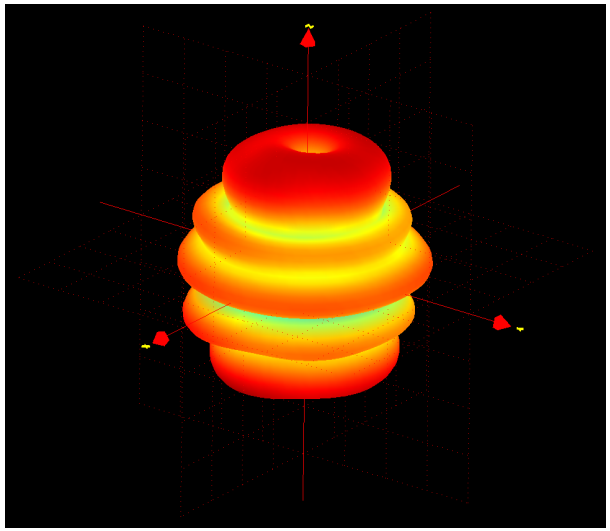
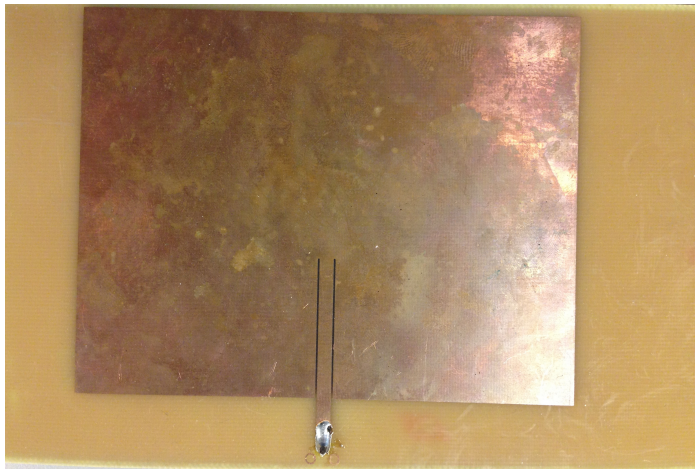
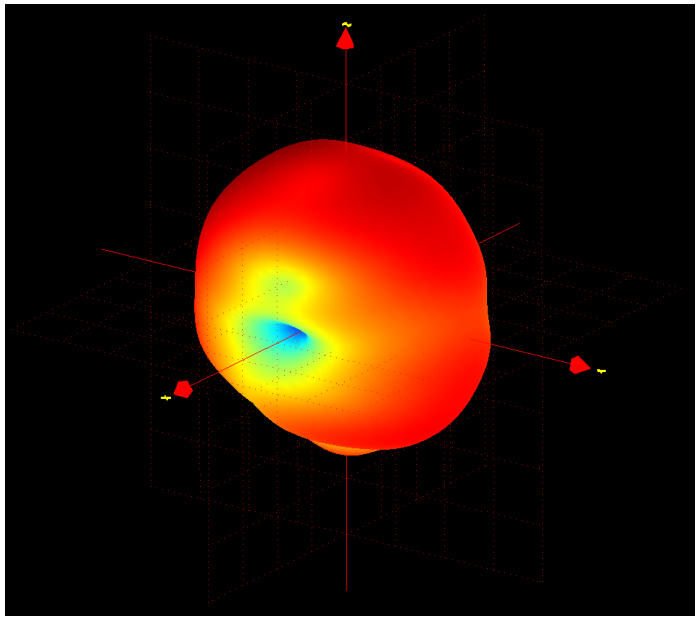
Test af antenner

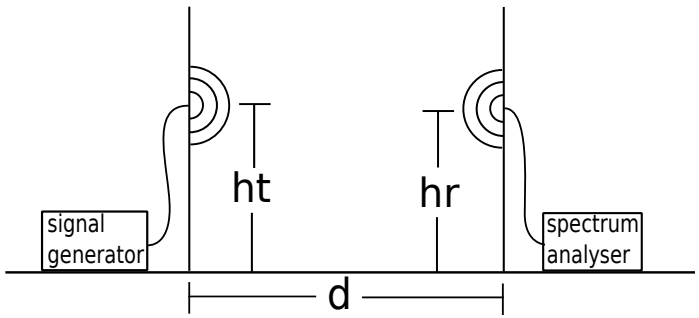


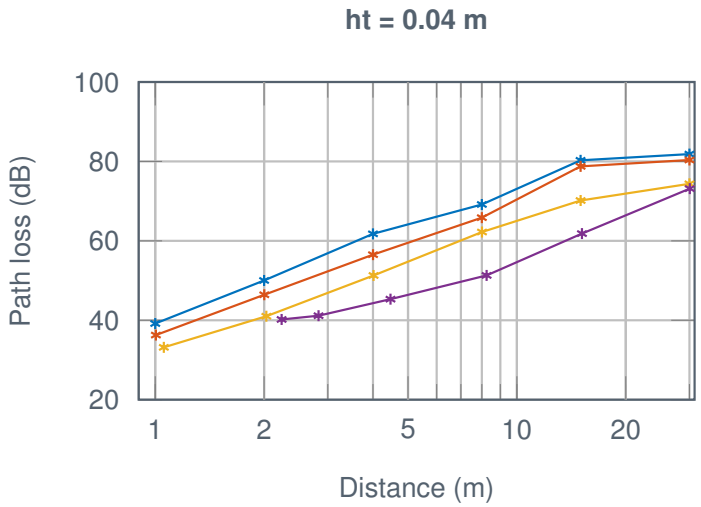


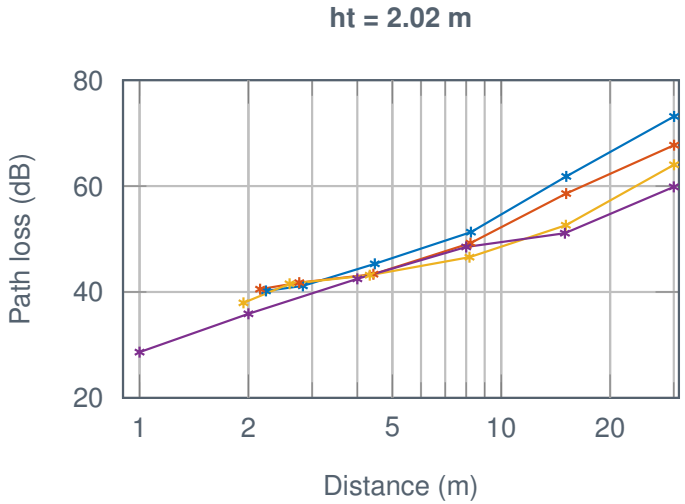


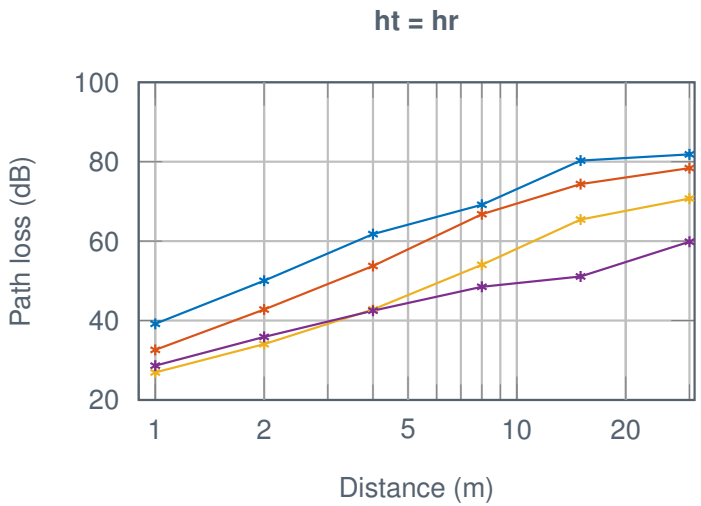


Måling af path loss









hr = 0.08 m hr = 0.14 m hr = 0.36 m hr = 2.02 m

Databehandling

- Find PL fra måling
- Find mean af PL for de forskellige parameter
- Find 95% confidence intervallet for hver parameter

$$PL = \frac{\text{Måling} \cdot \text{system tab}}{\text{Antenne gains}}$$

$$PL(par) = mean(PL_{par})$$

	Vertical Patch	Vertical Monopole	Horizontal Patch	Horizontal Monopole	Vertical Hal	Vertical P-plads	Horizontal Hal	Horizontal P-plads	Patch Hal	Patch P-plads	Monopole Hal	Monopole P-plads
	Hal vs P-plads				Patch vs Monopole				Vertical vs Horizontal			
+/- 5	80%	52%	53%	50%	55%	72%	25%	47%	83%	53%	53%	43%
+/- 10	10%	23%	27%	28%	37%	25%	50%	43%	13%	32%	15%	33%
+/- 15	5%	15%	10%	17%	7%	3%	13%	5%	2%	12%	15%	22%
Andre	5%	10%	10%	5%	2%	0%	12%	5%	2%	3%	17%	2%

Parameternes betydning

Distance	1 m	2 m	4 m
PL	(34.7±1.6) dB	(41.4±1.4) dB	(49.0±1.7) dB

Distance	8 m	15 m	30 m
PL	(57.3±2.1) dB	(66.1±2.5) dB	(72.3±2.3) dB

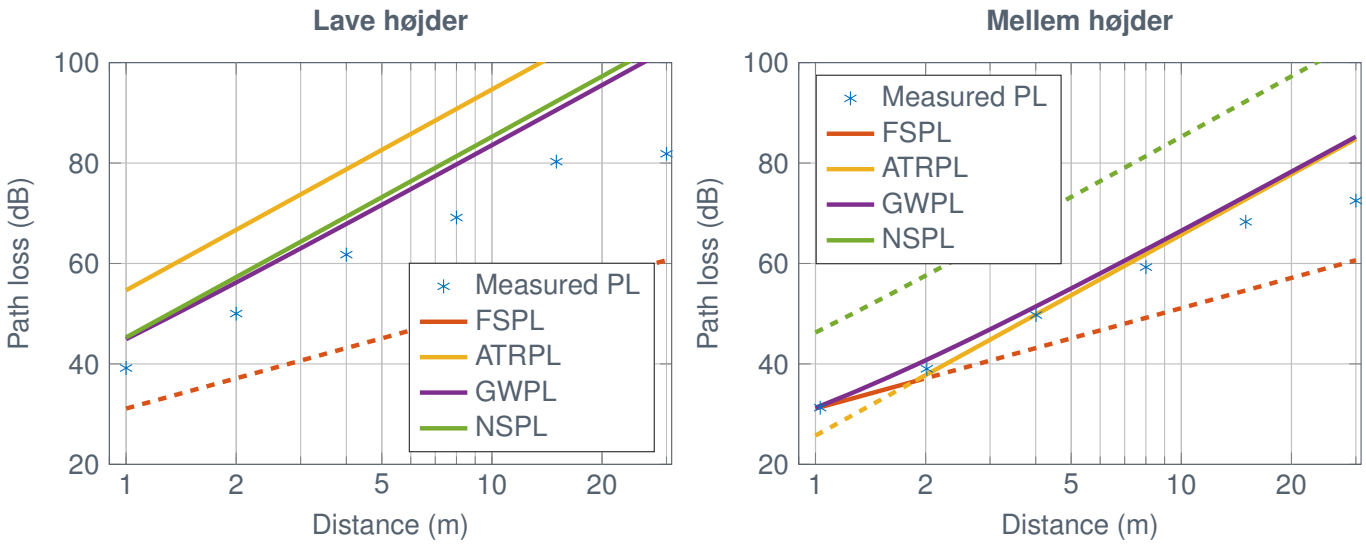
h_t \ h_r	0.04 m	0.14 m	0.36 m	2.02 m
0.04 m	(63.7±5.2) dB	(60.7±5.1) dB	(55.4±4.7) dB	(52.4±3.8) dB
0.14 m	(60.7±5.1) dB	(58.1±5.2) dB	(53.4±4.5) dB	(50.2±3.2) dB
0.36 m	(55.4±4.7) dB	(53.4±4.5) dB	(49.0±2.9) dB	(47.6±4.8) dB
2.02 m	(52.4±3.8) dB	(50.2±3.2) dB	(47.6±4.8) dB	(44.4±3.1) dB

Hal	Parkerings plads
(52.4±1.8) dB	(54.6±2.2) dB

Monopol	Patch
(55.6±2.0) dB	(51.4±2.0) dB

Vertikal	Horisontal
(51.8±1.9) dB	(55.1±2.1) dB

Foreslået PL model

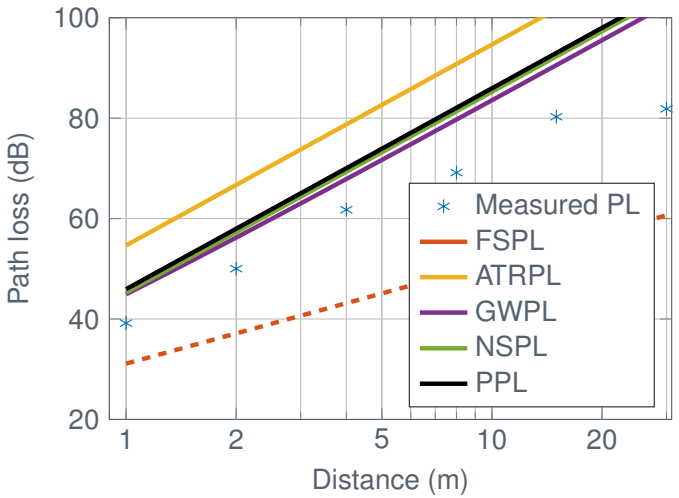


$$PPL = \left(ATRPL^{-1} + NSPL^{-1}\right)^{-1}$$

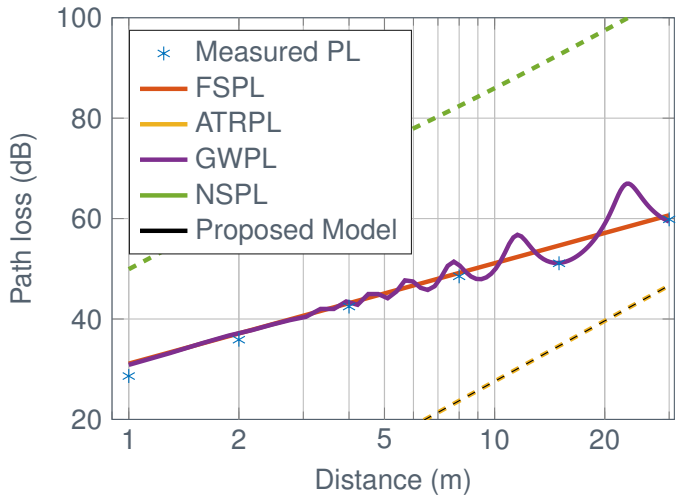
$$PPL = \frac{d^4}{h_t^2 h_r^2 + h_0^4}$$

Model fit

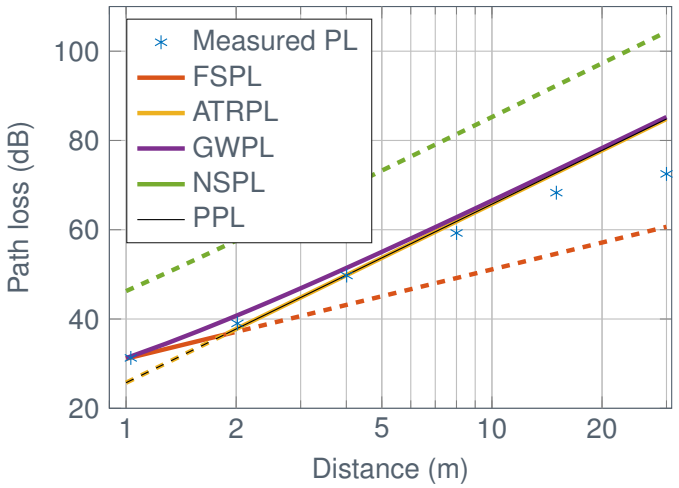
Lave højder



Høje højder



Mellem højder

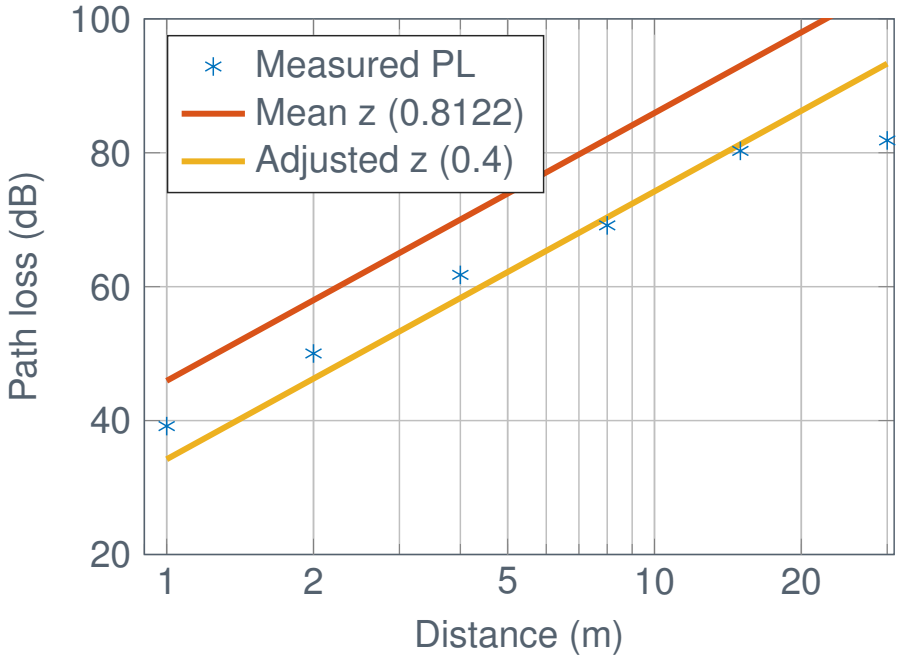


Models	MSE	Anvendelighed
FSPL	15.95	35 %
ATRPL	141.58	65 %
GWPL	35.49	100 %
NSPL	230.05	30 %
PPL	60.18	65 %

z parameteren

$$z_V = \frac{\sqrt{\epsilon_0 - \cos^2\theta}}{\epsilon_0}$$

$$z_H = \sqrt{\epsilon_0 - \cos^2\theta}$$



Questions

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