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HEC General Meeting

Calculations of Xtalk for HEC EST

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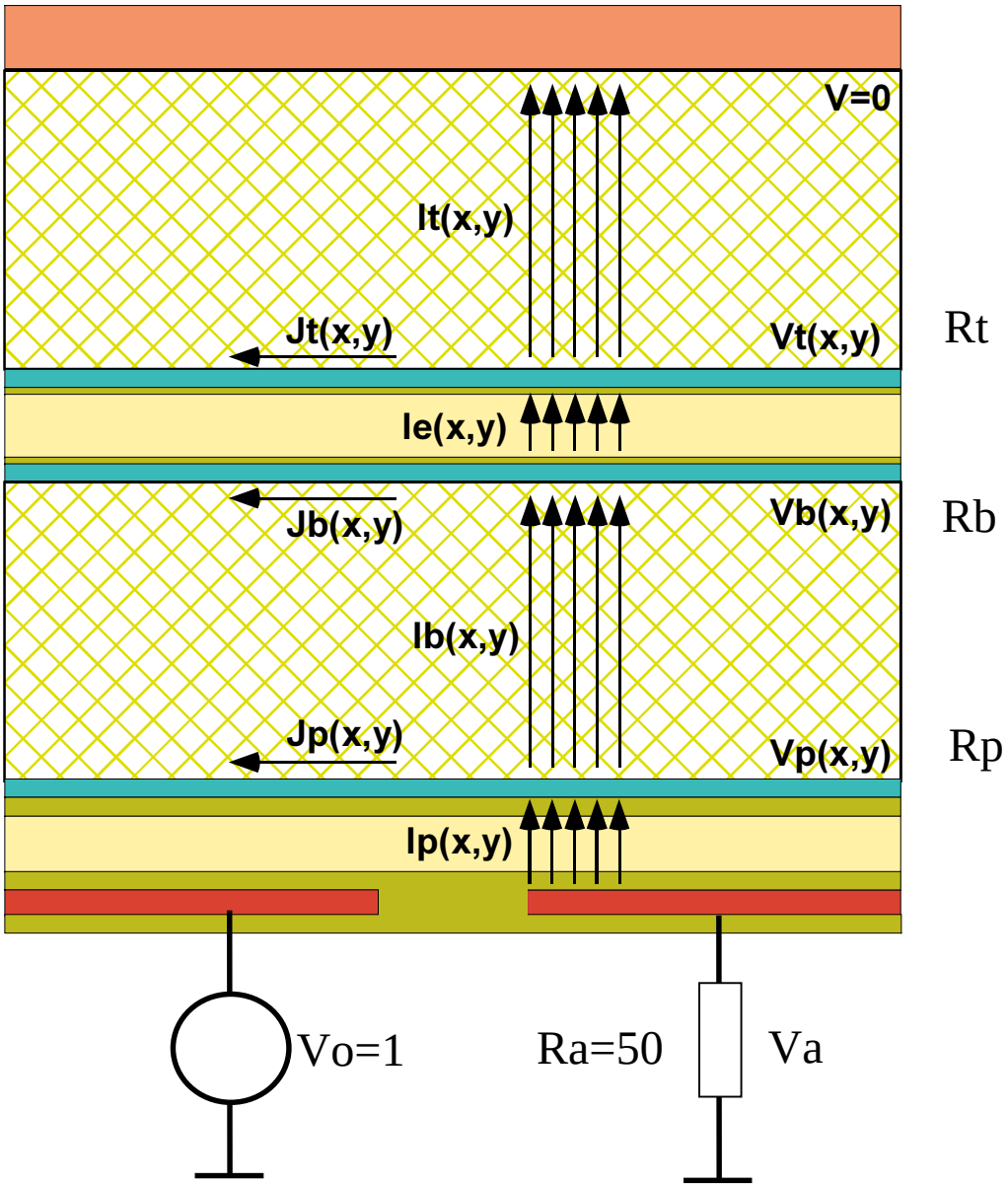
- Method of calculations
- Inter-pad potential
- Frequency dependence
- Time dependence
- Calculations for different R
- Conclusions

Analytical calculations

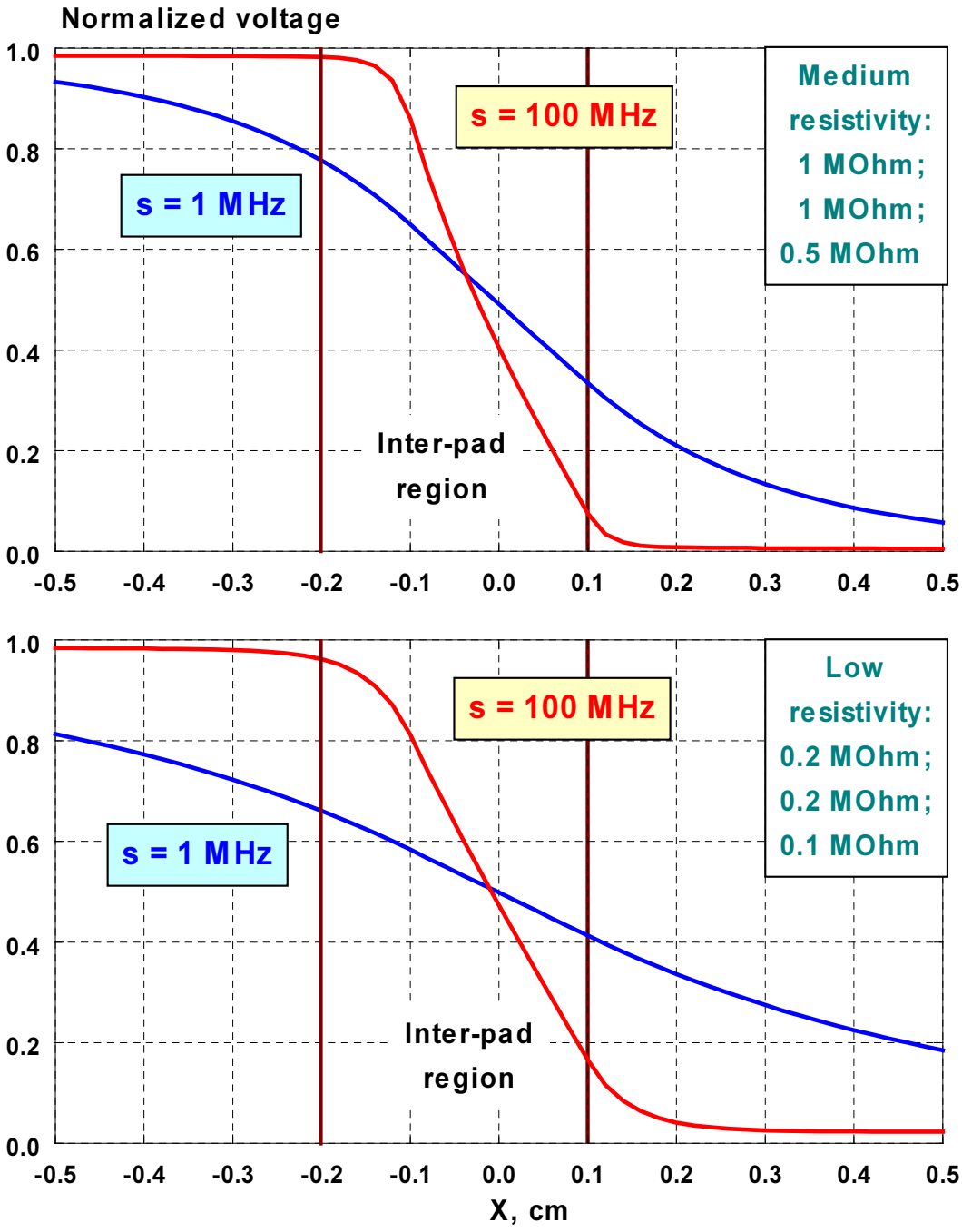
- No edge effects
- Uniformity in Y
- All ε are frequency independent



- Argon εa=1.52 Kapton εk=3.6

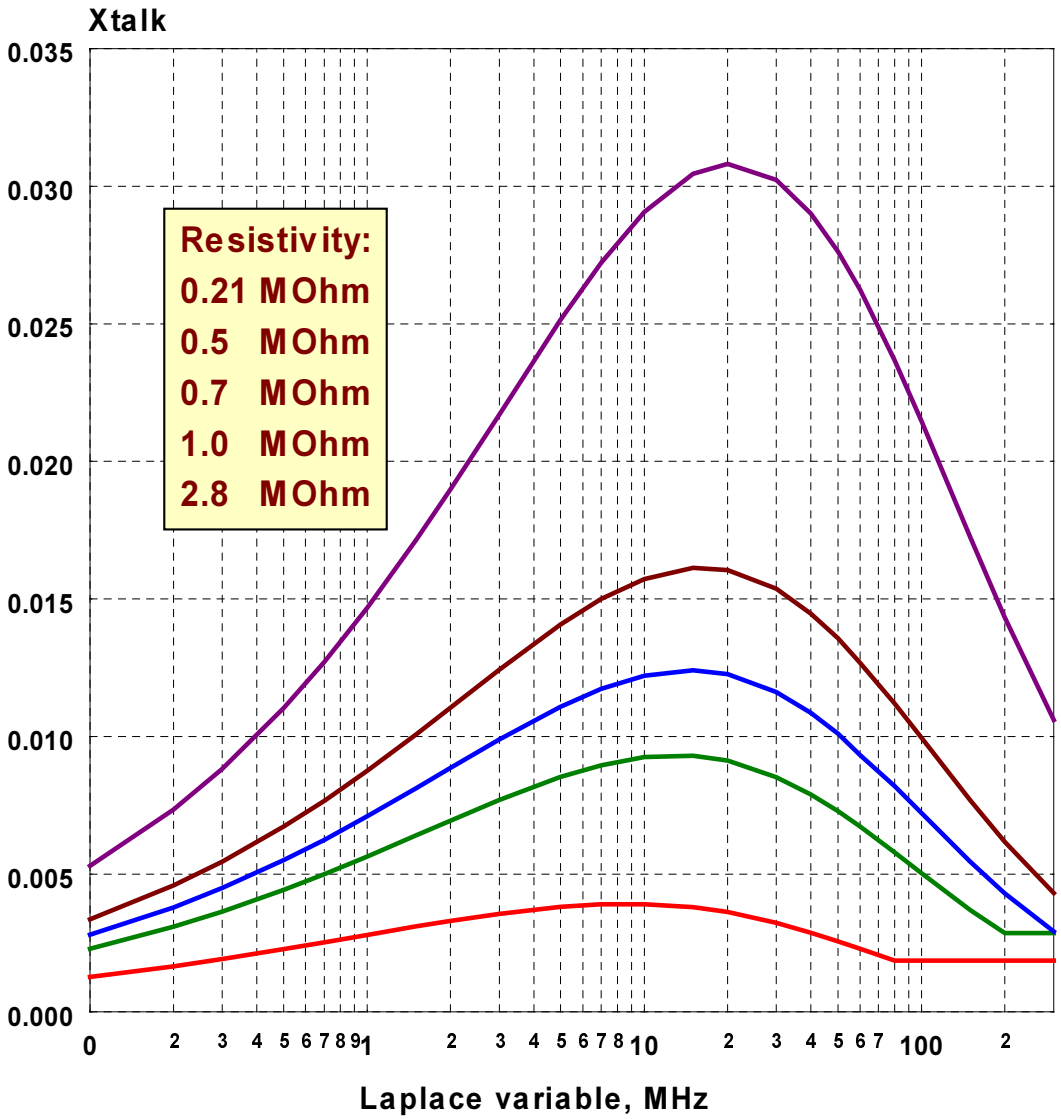
Inter-pad potential

- The system is described by 9 differential equations with 18 boundary conditions
- The analytical solution exists, the value of interest is potential on the pad board HRL



Frequency dependence

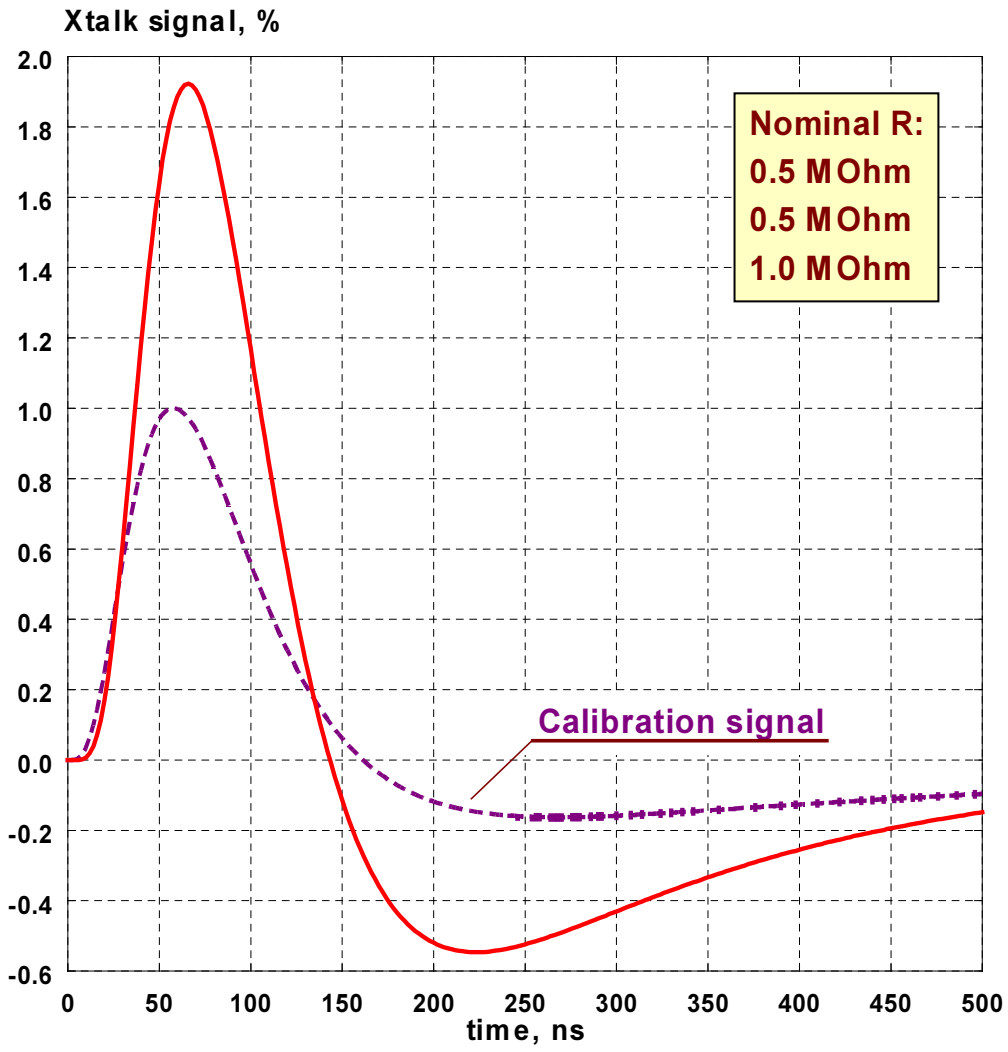
- Xtalk current is the integral over the pad area. In calculations pads 5 and 6 of LS-1 are considered (width 15.1 cm, length 16.8 cm
- Solution gives the voltage on the neighboring for the fixed frequency



- Calculational problem for low xtalk values at high frequency

Time dependence

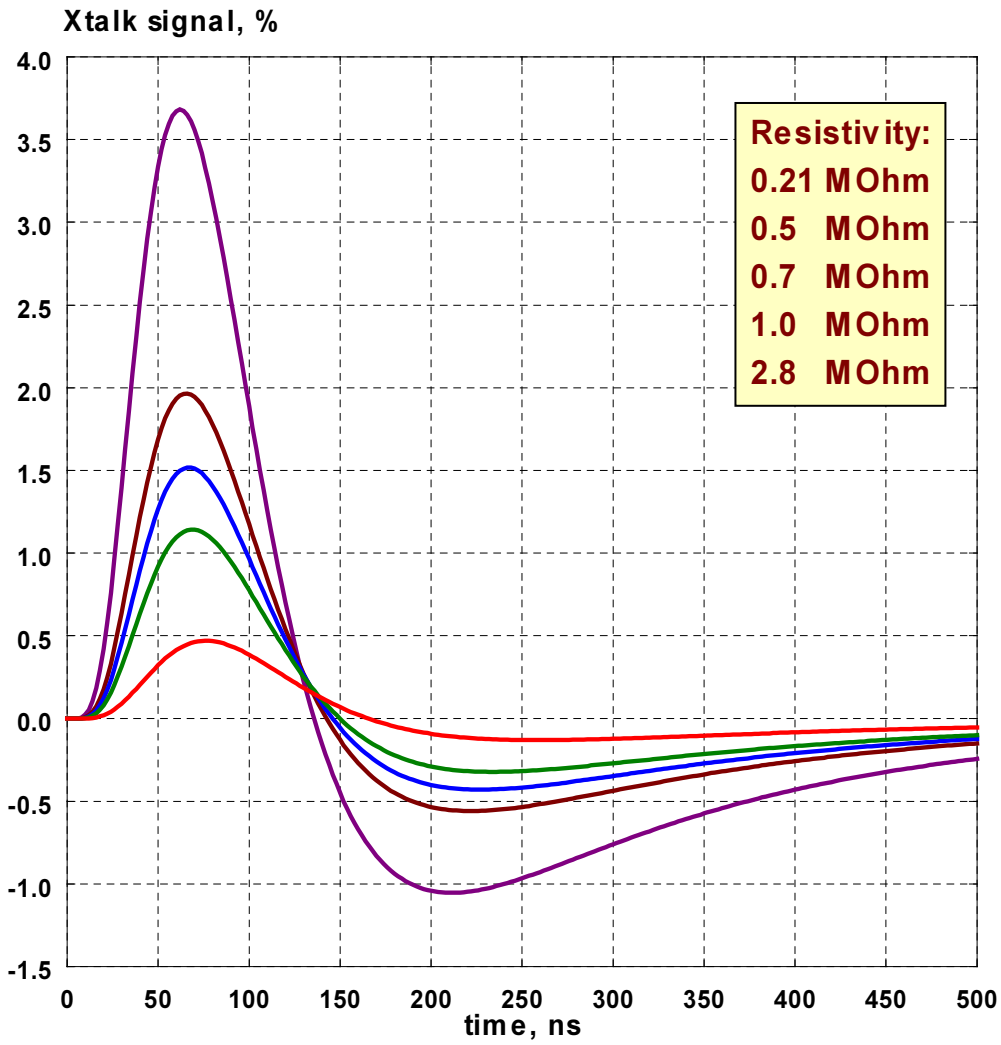
- Inverse Laplace transform gives the signal vs. time. The chain is typical HEC chain in test beam – 99
- Example: xtalk signal for nominal resistivity



- Amplitude 1.9%. For comparison: in TB-98 for this pad xtalk was 2.2% for Canadian module and 2.9% for Europian module. The shape was a bit shorter than calculated, that means additional capacitive coupling which is neglected in calculations

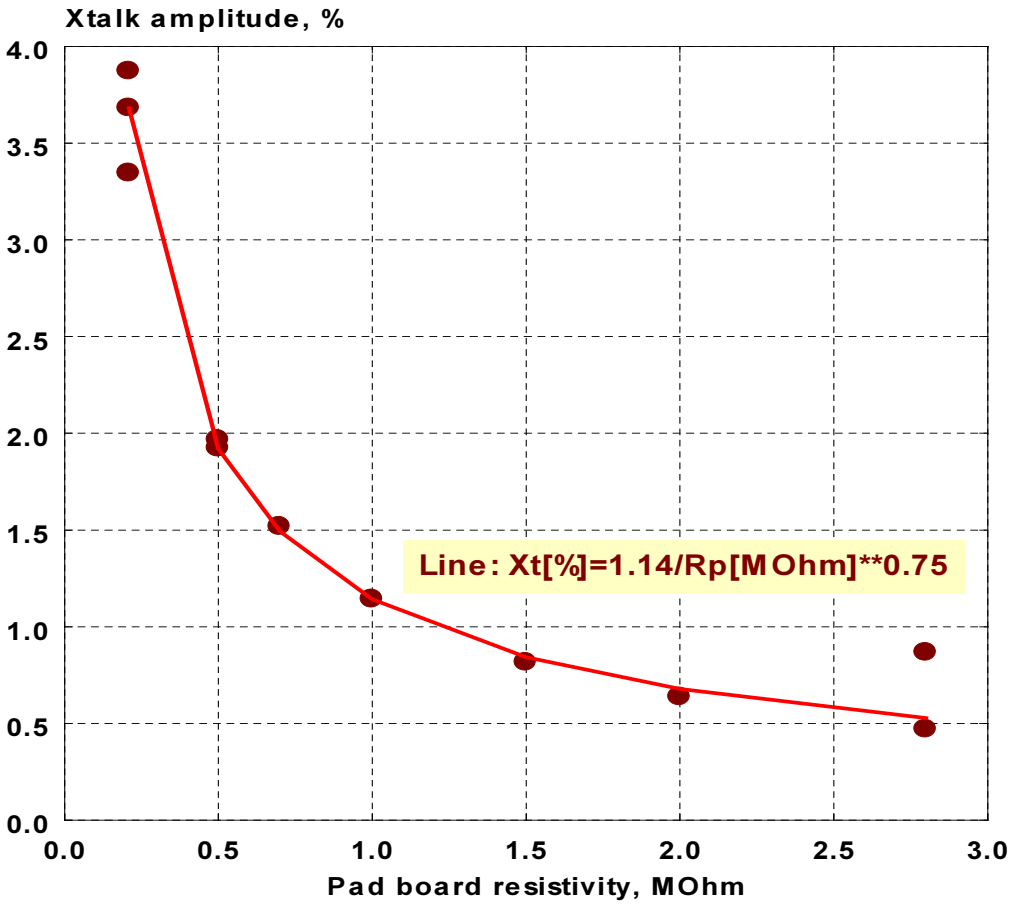
Different resistivities

- Up to now 11 combinations of Rp, Rb, Rt are studied, all R varied between 0.21 and 2.8 Mohm/Sq
- Example: xtalk signals vs R in the case when Rp = Rb = Rt



- Xtalk varies from 0.5% up to 3.7%. Value 2% is reached for R = 0.5 Mohm/Sq

Summary

Rp	Rb	Rt	Xt,%
0.21	0.21	0.21	3.68
0.21	0.11	0.11	3.87
0.21	2.80	2.80	3.34
0.50	0.50	1.00	1.92
0.50	0.50	0.50	1.97
0.70	0.70	0.70	1.52
1.00	1.00	1.00	1.14
1.50	1.50	1.50	0.82
2.00	2.00	2.00	0.64
2.80	2.80	2.80	0.47
2.80	0.21	0.21	0.87

- Xt depends mainly on Rp value, less sensitive to Rb and Rt
- So high R is preferable for pad board
- Xt(Rp) is parametrized by simple dependence