Model Pulses in the TD Design of UWB Wireless Signal Transfer Systems

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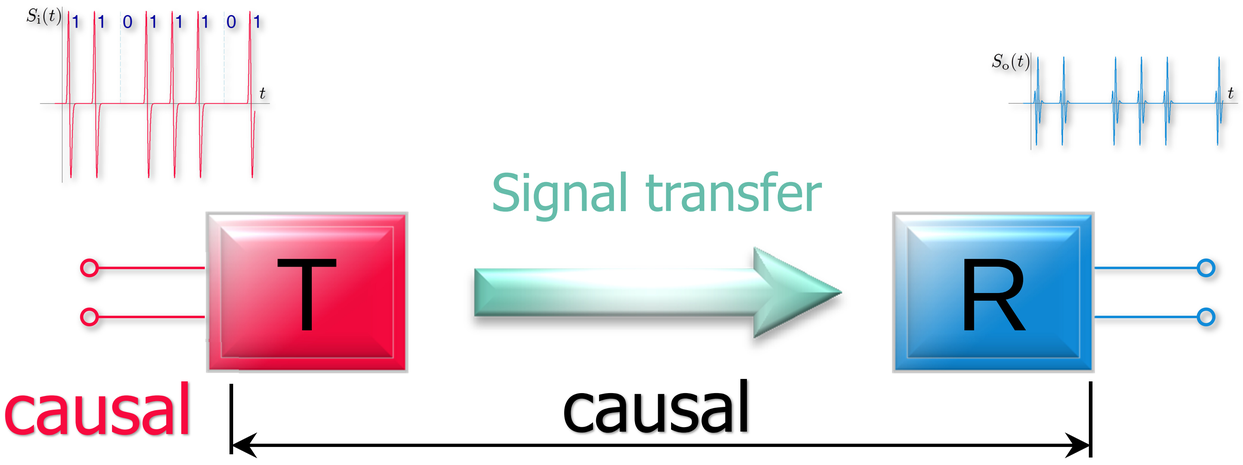
Service

- **Digital signal transfer:**

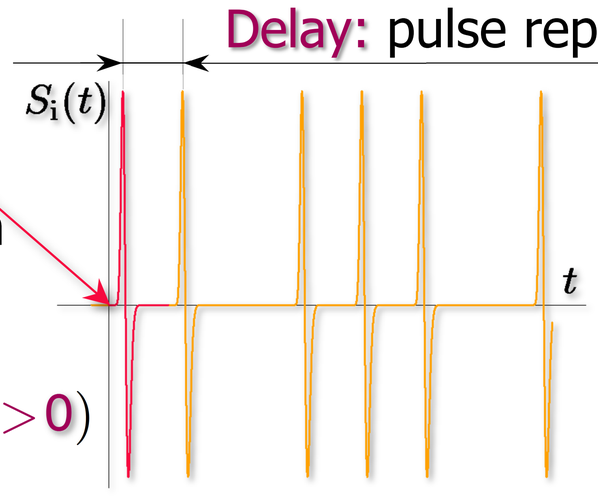


- **Conditions for a stable, reliable link:**

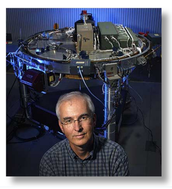
Delay: pulse repetition rate

Start point: discrimination between 0 and 1

$I(t_0+) = (<0|>0)$

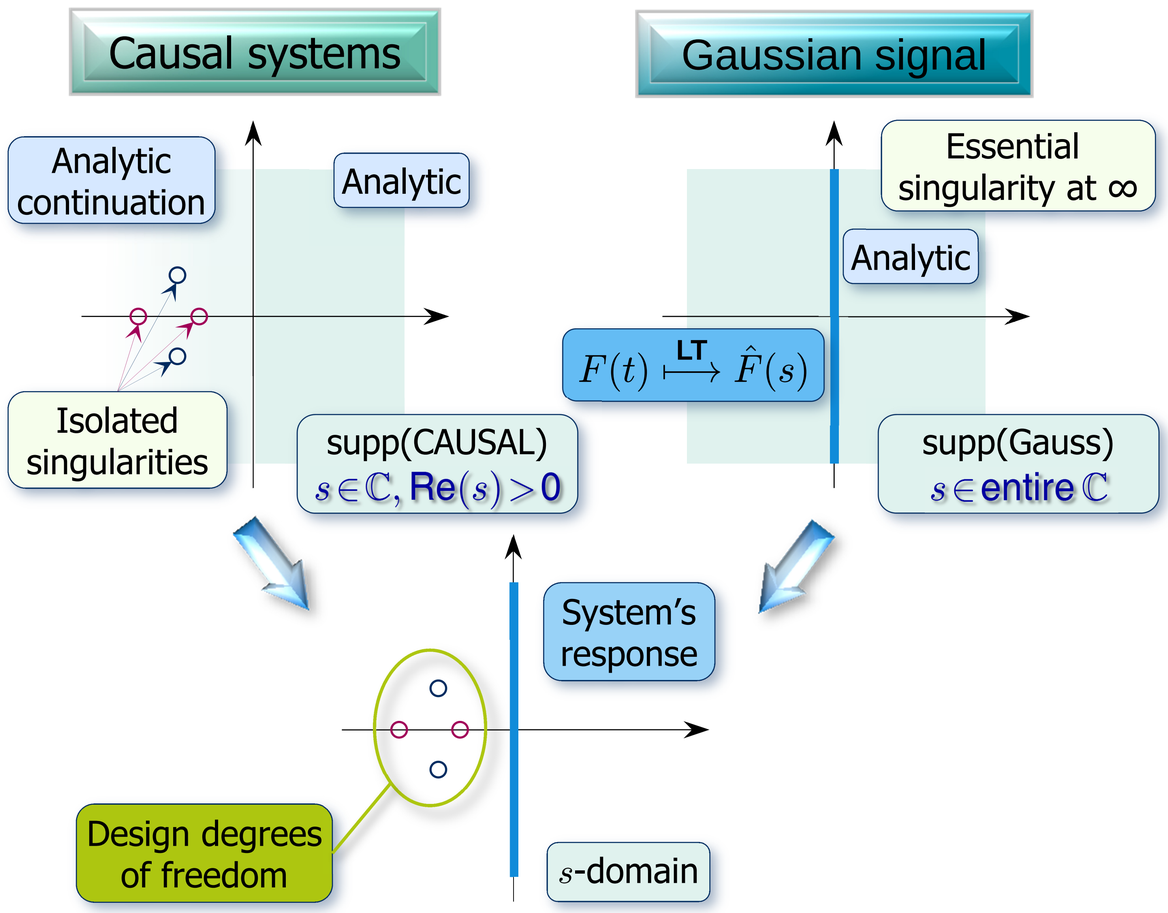


uncertainty has a price:



"Titan Calling" IEEE Spectrum, Oct 2004

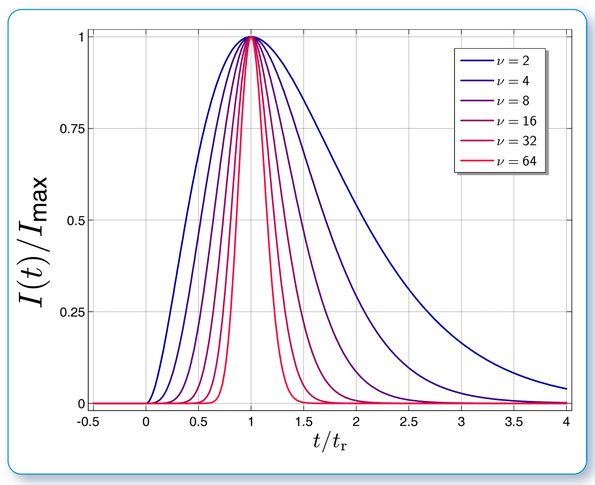
Design

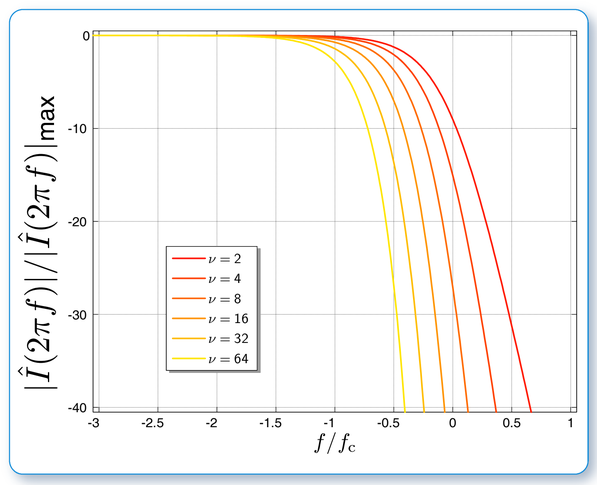


~~Causality~~ ➡ ~~design~~ & ~~service~~

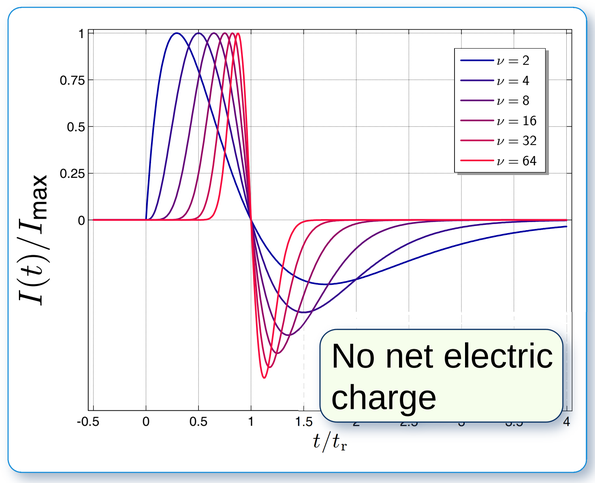
Our pulses

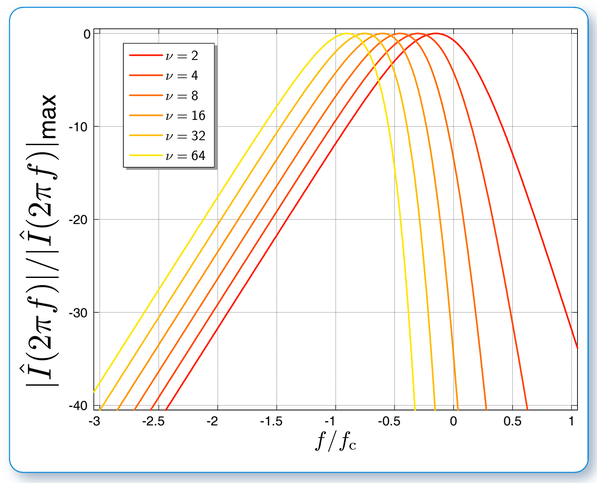
Unipolar pulse: the power exponential model pulse $I(t)$





Monocycle pulses: the time-differentiated power exponential model pulse $I(t)$



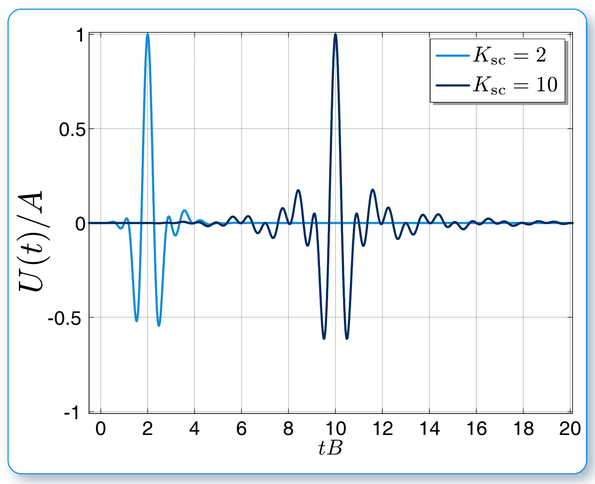


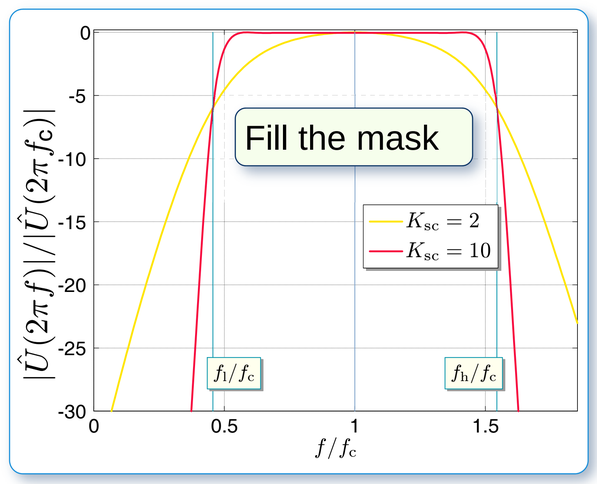
EMI/EMC regulations:

Spectral mask $(\mathrm{LEVEL}_\mathrm{max}, f_\mathrm{L}, f_\mathrm{H}) \subset$ Spectral diagram $(\hat{I}(2\pi f))$

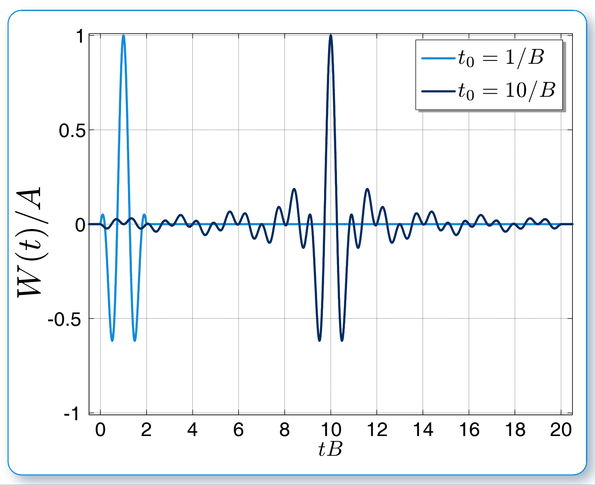
Rectangular mask ➡ $\mathrm{sinc}(t) =$ non-causal!

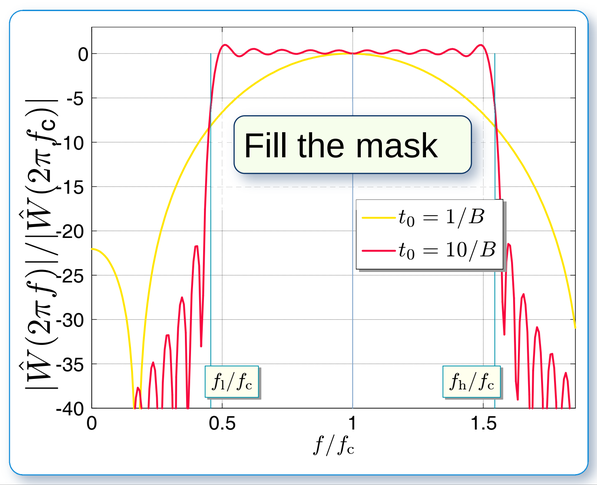
Quasi-rectangular spectral diagram: the power exponential modulated – sinc-cosine model pulse $U(t)$





Quasi-rectangular spectral diagram: the time-windowed sinc-cosine model pulse $W(t)$





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