TSKS10 Signaler, information & Kommunikation

Föreläsning 2

Basbandsrepresentation, Samplade system

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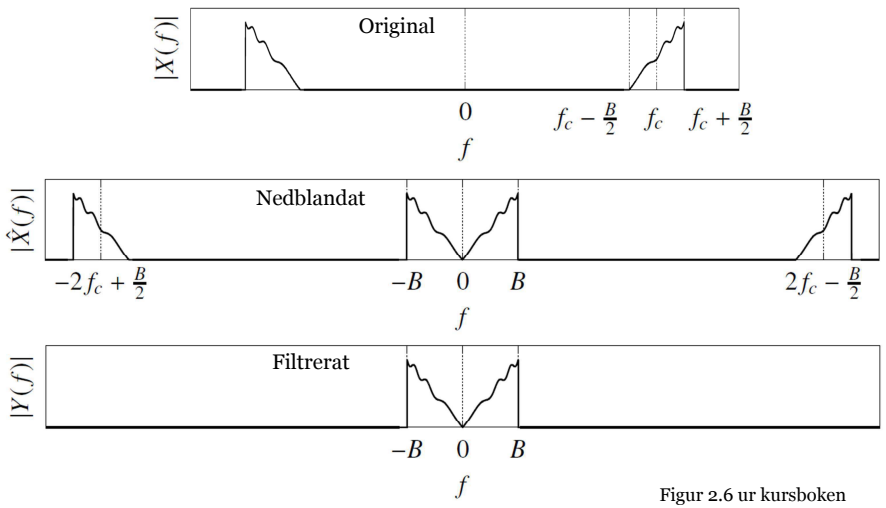
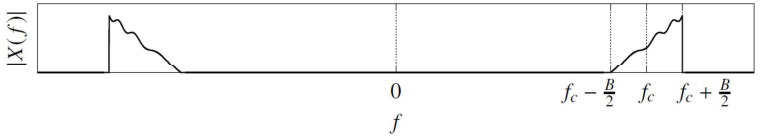
Direkt demodulation (nedblandning)



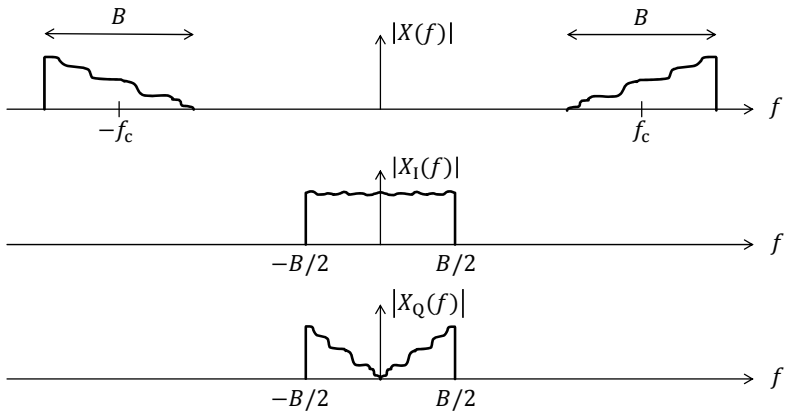
Figur 2.6 ur kursboken

Spektrum $X(f)$ av smalbandig signal $x(t)$



Figur 2.5 ur kursboken

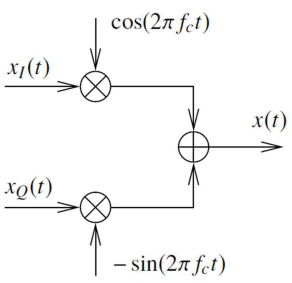
I/Q-representation passbandssignal



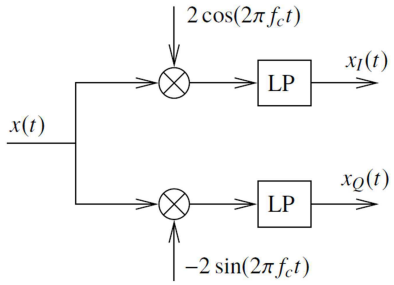
Figur 2.7 ur kursboken

I/Q-modulator/demodulator – idealt fall

Modulering

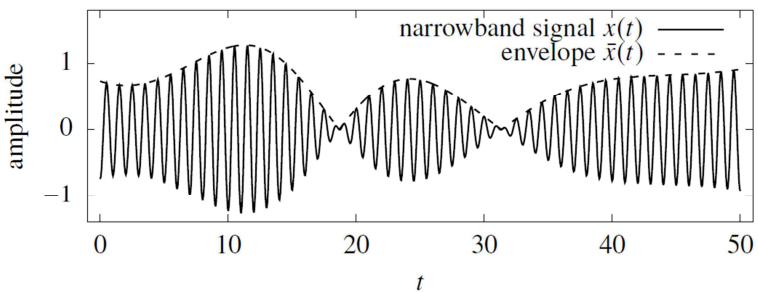


Demodulering



Figur 2.7 ur kursboken

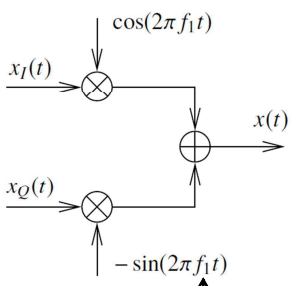
Envelopp av smalbandig signal



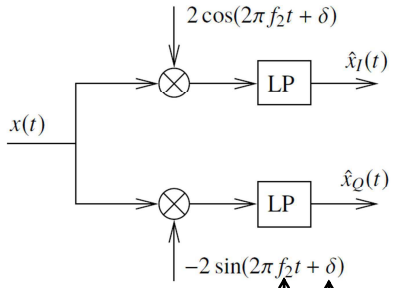
Figur 2.8 ur kursboken

I/Q-modulator/demodulator – verkligheten

Modulering



Demodulering

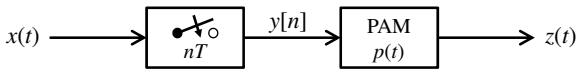


Olika frekvens

Oönskad fasvridning

Kombination av figur 2.10 och 2.11 ur kursboken

Samplingsteoremet för deterministiska Signaler



Samplingsteoremet:

Betrakta en signal $x(t)$, med spektrum $X(f)$ och $X(f) = 0$ för $|f| \geq f_0$. Om $x(t)$ samplas med samplingsfrekvens f_s, då kan $x(t)$ rekonstrueras utan fel från den samplade signalen om $f_s \geq 2f_0$ holds.

Detta betyder:

Det existerar en pulsform $p(t)$, sådan att $x(t)$ kan skrivas som

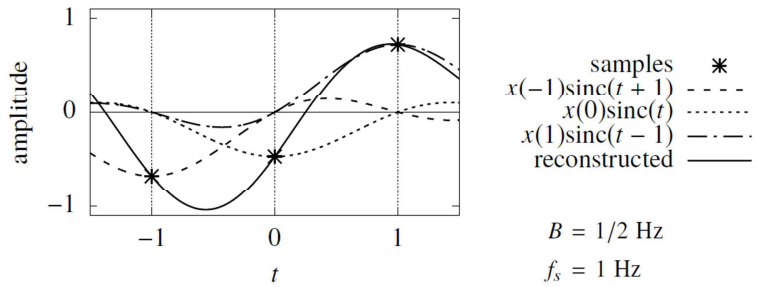
$$x(t) = \sum_n x(nT)\, p(t - nT)$$

om $f_s \geq 2f_0$ gäller, med $f_s = 1/T$.

Uppfyllt för:

Ideal rekonstruktion: $p(t) = \mathrm{sinc}(t/T)$

Sampling och interpolation



Figur 5.6 ur kursboken

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