EECE 233 Fall 2014 Lec. 29

Announcements

1. Midterm 3 : this Friday 19:30 –
2. Final Exam : Next Monday 〃 –
3. Course evaluation.

Review

Sampling

Sample-and-hold

ADC

CD convertor $x_d[n] \hat{=} x_c(nT_s), \forall n$

C/D conversion

Q1. Given $x_c(t)$.

define $x_d[n] \triangleq x_c(nT_s + \Delta)$, $\forall n$.

Find $X_d(e^{j\omega})$ in terms of $X_c(j\omega)$.

$x_c(t)$

$= \frac{1}{2\pi}\int_{-\infty}^{\infty} X(j\omega)e^{j\omega t}d\omega$

A!

$$X_d(e^{j\omega}) = \sum_{n=-\infty}^{\infty} x_d[n]e^{-j\omega n} = \sum_{n=-\infty}^{\infty} x_c(nT_s)e^{-j\omega n}$$

$$= \sum_{n=-\infty}^{\infty}\left(\frac{1}{2\pi}\int_{-\infty}^{\infty} X(j\omega)e^{j\omega nT_s}d\omega\right)e^{-j\omega n}$$

$= \cdots$

D/C conversion

Q2. Given $y_d[n]$, T_I, $p(t)$,

define

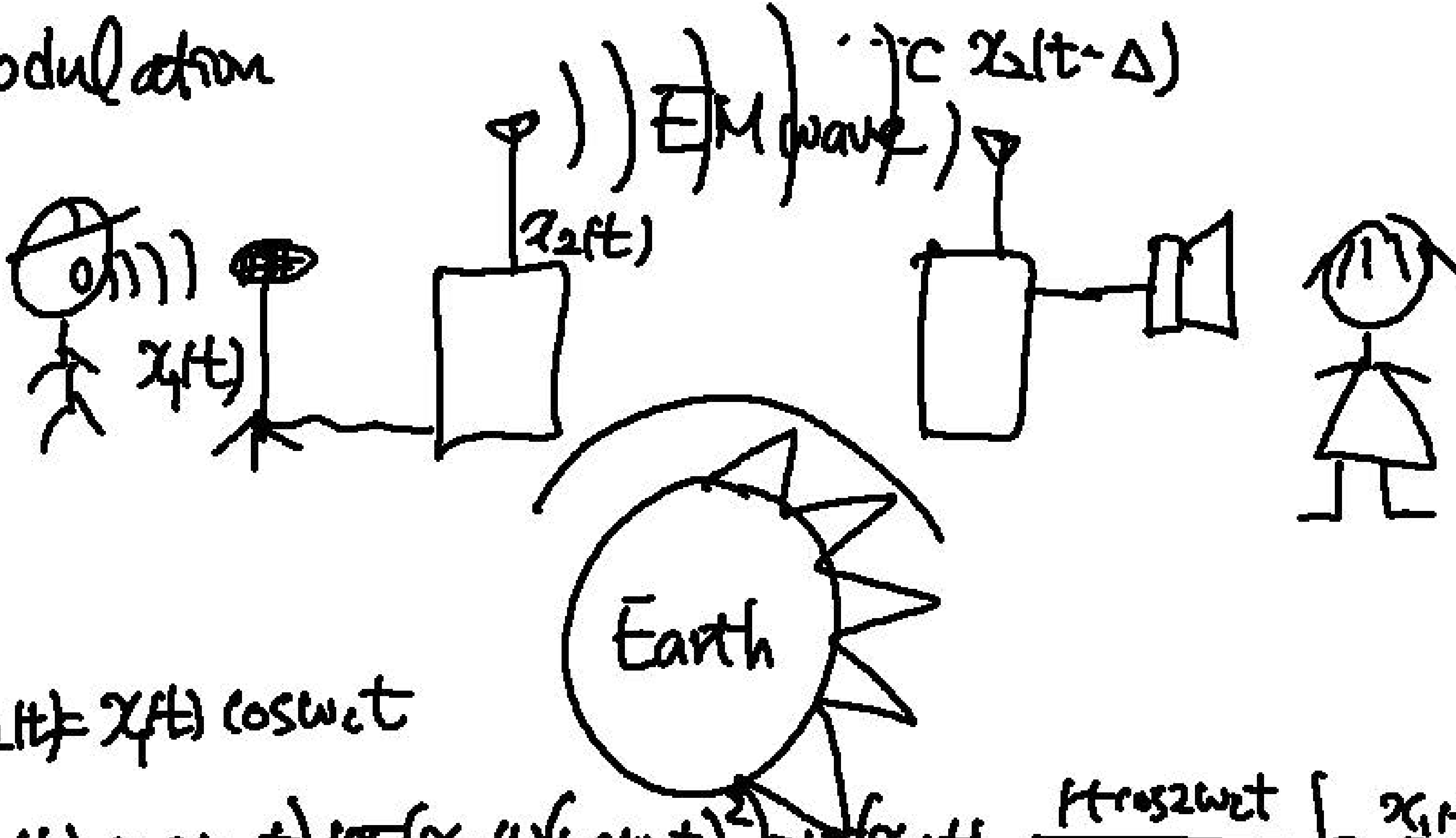
$$y_c(t) = \sum_{n=-\infty}^{\infty} y_d[n]\, p(t-nT_I)$$

Find $Y_c(j\omega)$ in terms of $Y_d(e^{j\omega})$

A2. $$Y_c(j\omega) = \int_{-\infty}^{\infty} y_c(t) e^{-j\omega t}\, dt$$

$$= \int_{-\infty}^{\infty} \left(\sum_{n=-\infty}^{\infty} y_d[n]\, p(t-nT_I) \right) e^{-j\omega t}\, dt = \underline{\qquad\qquad}.$$

Modulation



$$x_2(t) = x_1(t)\cos\omega_c t$$

$$LPF\left(x_2(t)\cos\omega_c t\right) = LPF\left(x_1(t)(\cos\omega_c t)^2\right) = LPF\left(x_1(t)\frac{1+\cos 2\omega_c t}{2}\right) = \frac{x_1(t)}{2}$$