Reconstruction

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Reconstruction of Signals

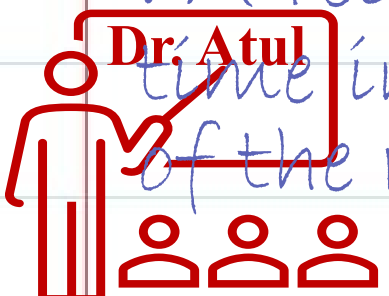
The signal reconstruction is defined as the process of obtaining the analog signal $x(t)$ from the sampled signal $x_s(t)$. The data reconstruction is also known as **interpolation**.

The sampled signal is given by,

$$x_s(t) = x(t) \sum_{n=-\infty}^{\infty} \delta(t - nT)$$

$$\Rightarrow x_s(t) = \sum_{n=-\infty}^{\infty} x(nT)\,\delta(t - nT)$$

Where, $\delta(t-nT)$, is zero except at the instants $t=nT$. A reconstruction filter which is assumed to be linear and time invariant has unit impulse response $h(t)$. The output of the reconstruction filter is given by the convolution as,



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$$y(t) = \int_{-\infty}^{\infty} \sum_{n=-\infty}^{\infty} x(nT)\,\delta(k - nT)\,h(t-k)\,dk$$

By rearranging the order of integration and summation, we get,

$$y(t) = \sum_{n=-\infty}^{\infty} x(nT) \int_{-\infty}^{\infty} \delta(k - nT)\,h(t-k)\,dk$$

$$\therefore y(t) = \sum_{n=-\infty}^{\infty} x(nT)\,h(t - nT)$$

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Practice questions

1. What do you mean by reconstruction of signals from sampled data ?
2. If one engineer has a sampled data $x(nT)$. He wants to reconstruct his original signal using a reconstruction filter $h(t)$. Calculate the signal reconstructed using $h(t)$.

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Thank you for your attention!