

Lecture 10 – 09/21/2015

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- Fourier Series Representation of Periodic Signals
 - As before, we discuss a representation of signals as linear combinations of a set of basic signals
 - The basic signals here are complex exponentials
 - Response of an LTI system to a complex exponential has a simple form

- History of Fourier Analysis
 - Concept of “trigonometric sums”
 - Euler’s examination of the vibration string
 - The LTI response “property” to complex exponentials would not be important if these signals do not arise often in practice
 - Lagrange’s criticism on signals with discontinuous slopes
 - Fourier’s motivation through the phenomenon of heat propagation and diffusion
 - Harmonically related sinusoids are useful in representing the temperature distribution through a body
 - Dirichlet provided precise conditions under which a periodic signal admits this representation
 - The Fast Fourier Transform (FFT) and its suitability for digital systems

- LTI System Response to Complex Exponentials
 - Output is same complex exponential with a different amplitude
 - Eigenfunctions and Eigenvalues
 - How complex exponentials are eigenfunctions of LTI systems
 - Example 3.1