Fourier Transform

Fourier Transform

This chapter continues our coverage of **Fourier Analysis** with an introduction to the **Fourier Transform**.

- **Fourier Series** is used when we are dealing with signals that are *periodic* in time. It is based on harmonics of the fundamental frequency ω_0 of the periodic signal where the period $T = 2\pi/\omega_0$.

- The line spectrum occur at integer multiples of the fundamental frequency $k\omega_0$ and is a *discrete* (or sampled) function of frequency.

- As the period T is increased, the distance between harmonics decreases because ω_0 reduces.

- In the limit $T \to \infty$, the signal becomes **aperiodic** and $k\omega_0 \to \omega$ which is a *continuous* function of frequency.

This is the basis of the **Fourier Transform** which is very important as the basis for data transmission, signal filtering, and the determination of system frequency reponse.

Scope and Background Reading

The material in this presentation and notes is based on Chapter 8 (Starting at Section 8.1) of Karris (Karris, 2012). I also used Chapter 5 of (Boulet, 2006) from the **Recommended Reading List**.

References

1. Karris, S. T. (2012). *Signals and systems with MATLAB computing and Simulink modeling*. Fremont, CA.: Orchard Publishing. Retrieved from https://ebookcentral.proquest.com/lib/swansea-ebooks/reader.action?docID=3384197
2. Boulet, B. (2006). *Fundamentals of signals and systems*. Hingham, Mass.: Da Vinci

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