DIGITAL FILTERS

Syllabus : (10 hrs., 10 wks.)

Review of transforms : definition and properties of discrete-time Fourier transform (DTFT), discrete Fourier transform (DFT), and the z-transform. Spectra relationship between Fourier transform and DTFT : sampling, aliasing and Nyquist rate. Relationship between z-transform and DTFT.

Introduction to digital filter : system equations, direct and canonic forms. Classification of filters : infinite-impulse response and finite impulse-response filters. Examples of digital filters (comb filter and resonator). Practical desired filter specifications.

IIR filter design : impulse-invariant method, bilinear transformation and match *z*-transform methods. FIR filter design : windowing method, DFT/windowing method and frequency sampling method. Comparison between IIR and FIR filters. Appendix : analog lowpass filter design.

References

[1] * Kuc, R., 'Introduction to Digital Signal Processing', McGraw-Hill, 1982.

[2] Robert, R. A. and Mullis, C. T., 'Digital Signal Processing', Addison- Wesley, 1987.

[3] Oppenheim, A. V. and Schafer, R. W., 'Discrete-Time Signal Processing', Prentice Hall, 1989.

[4] Blinchikoff, H. J. and Zverev, A. I., 'Filtering in the Time and Frequency Domains', J Wiley, 1976.

[5] Hamming, R. W., 'Digital Filters', 2/e, Prentice-Hall, 1983.

[6] Lam, H. Y.-F., 'Analog and Digital filters', Prentice-Hall, 1979.

[7] Van Valkenburg, M. E., 'Analog Filter Design', Holt, Rinehart and Winstion Pubs., 1982.