TÉCNICO LISBOA

Instituto Superior Técnico

Digital Signal Processing Systems

FIR & IIR filter design

1. Using the Fourier series development method, design an ideal high-pass FIR filter with unity DC gain, cut-off at $f_c = 2$ kHz and constant group delay equal to 0.5 ms. What kind of coefficient symmetry can be expected? Compute the arithmetic format that should be used for the coefficients and for the filter output.

2. Design a low-pass IIR digital filter with unity DC gain, a real pole at $f_p = 2$ kHz using the impulse invariance method and the bilinear transformation method with pole frequency pre-distortion at the pole frequency. Compare the magnitude of the frequency response of the three filters.

Note: Consider the sampling frequency $f_s = 8$ kHz.