

Homework 4

1. Let $H(\gamma)$ be the response function (Fourier Transform) of the corresponding filter sequence of the Haar scaling function. Verify that to add one vanishing moment to a PFFS-dual of H , the secondary component ΔH can be written as $\Delta H(\gamma) = \sin 2\pi\gamma(i/4)\overline{H(\gamma + 1/2)}e^{-2\pi i\gamma}$. Find also the corresponding filter sequence of ΔH . (Hint: consider $\Delta H = \hat{q}(\gamma)\overline{H(\gamma + 1/2)}$, and find the time sequence of \hat{q} first and then use the convolution property)
2. Assume that H^0 is symmetric, and assume that ΔH is given by the Theorem in section 3.4. Verify that the resulting new PFFS-dual \tilde{H} is indeed symmetric.
3. Consider the case that are symmetric about $1/2$. Assume that $\Delta H = \hat{q}(\gamma)\overline{H(\gamma + 1/2)}$ is given by the Theorem under section 3.5. Find the associated filter sequence of $\hat{q}(\gamma)$.