

Wavelets and Multiresolution Processing

7.1.1 Image Pyramids

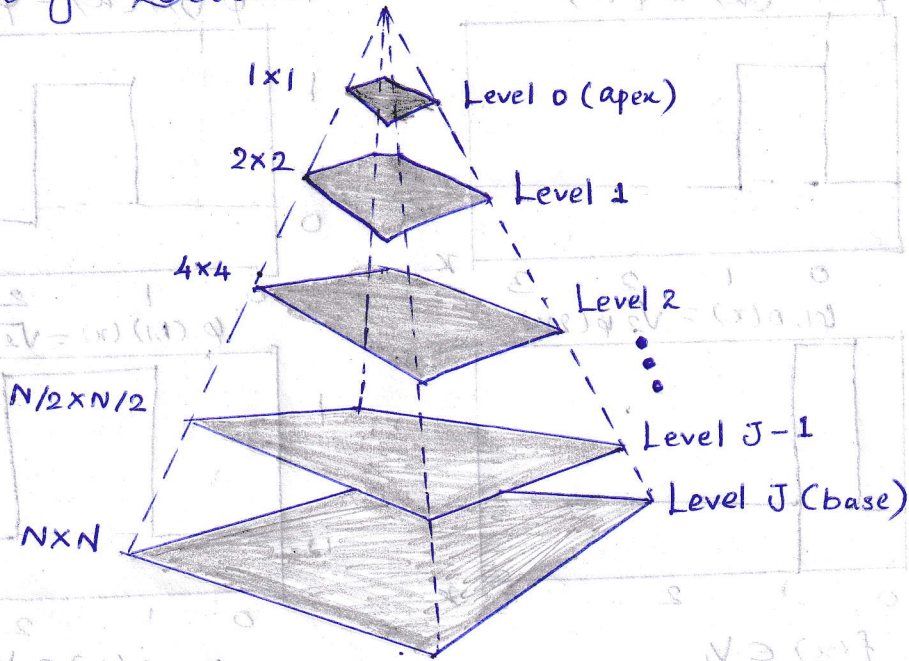
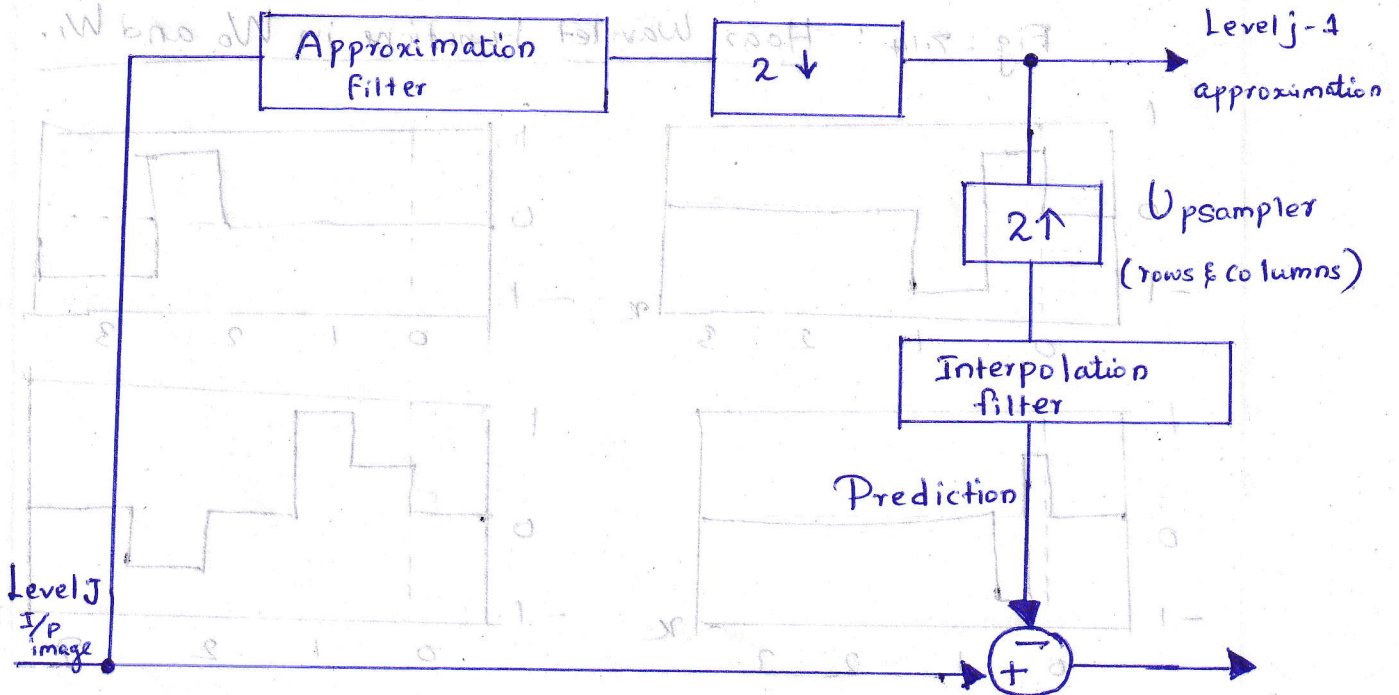


Figure 7.2

(a) An image Pyramid

Downsampler
(rows and columns)



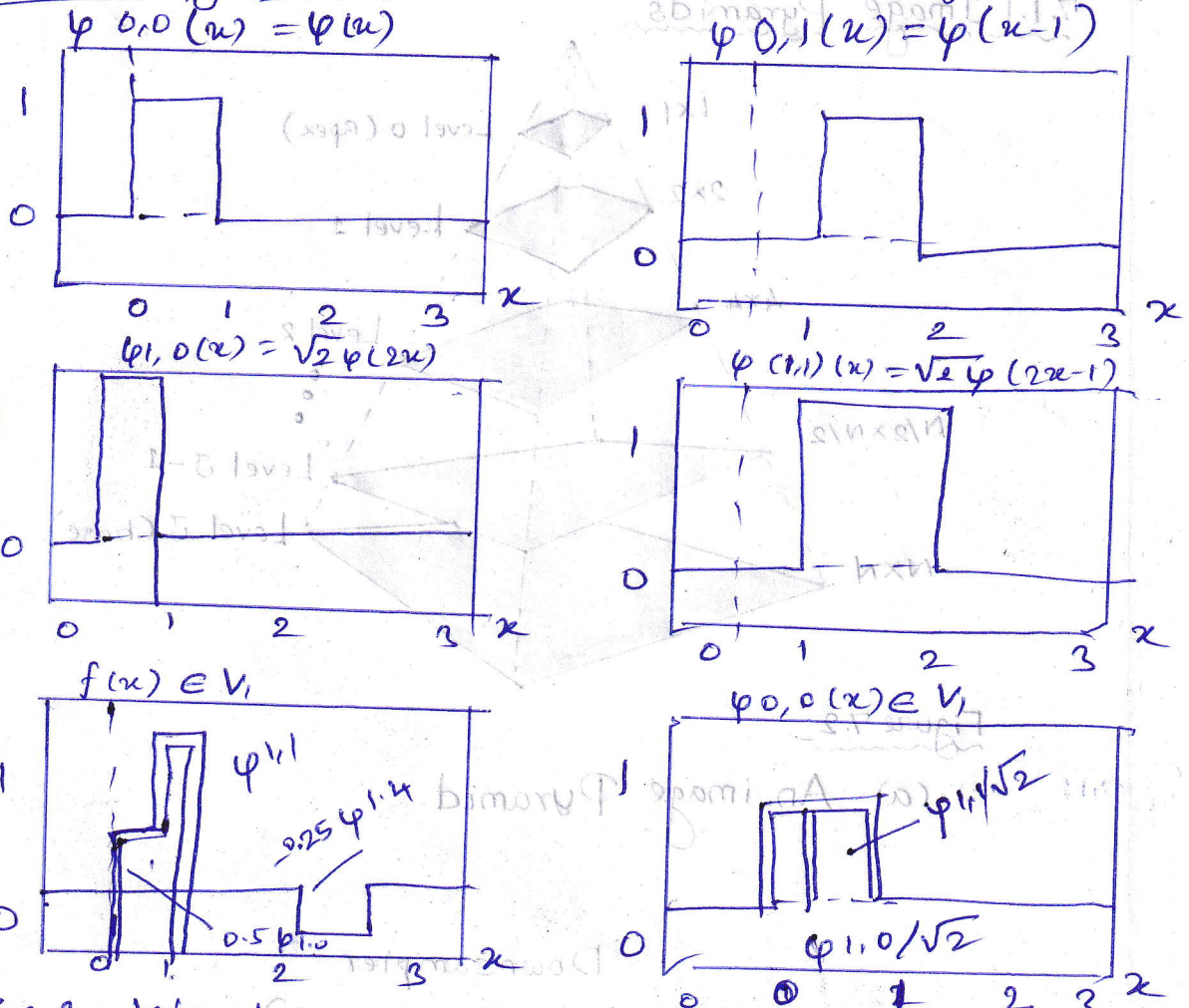
(b) A simple system for creating approximation and prediction residual pyramids.

7.2. Multiresolution Expansions

7.2.2 Scaling Functions

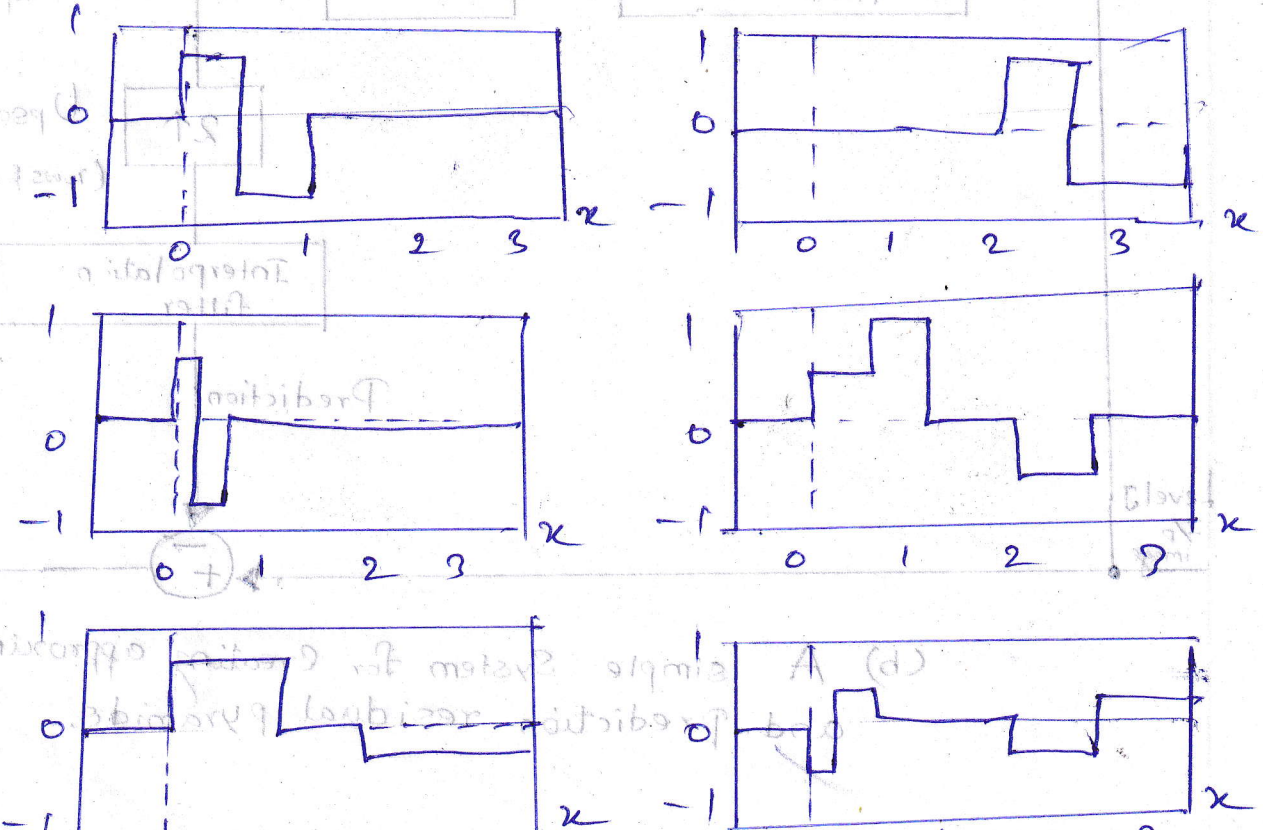
Figure: 7.11

Some Haar Scaling Functions.



7.2.3 Wavelet Functions

Fig: 7.14: Haar Wavelet Functions in W_0 and W_1 .



7.4. The Fast Wavelet Transform

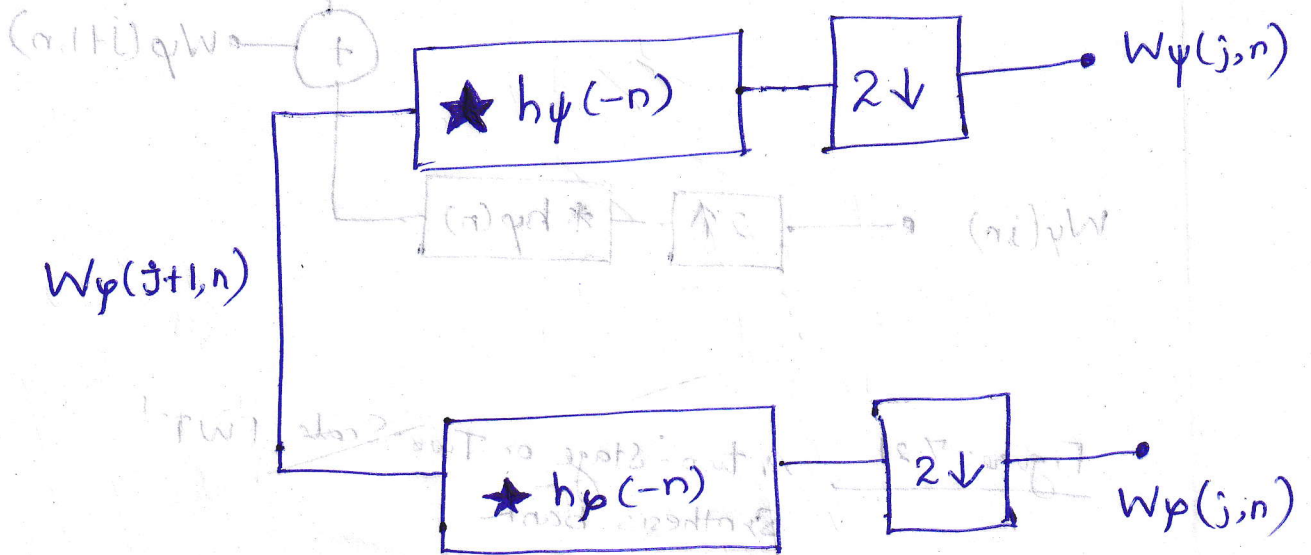


Figure 7.17: An FWT analysis bank

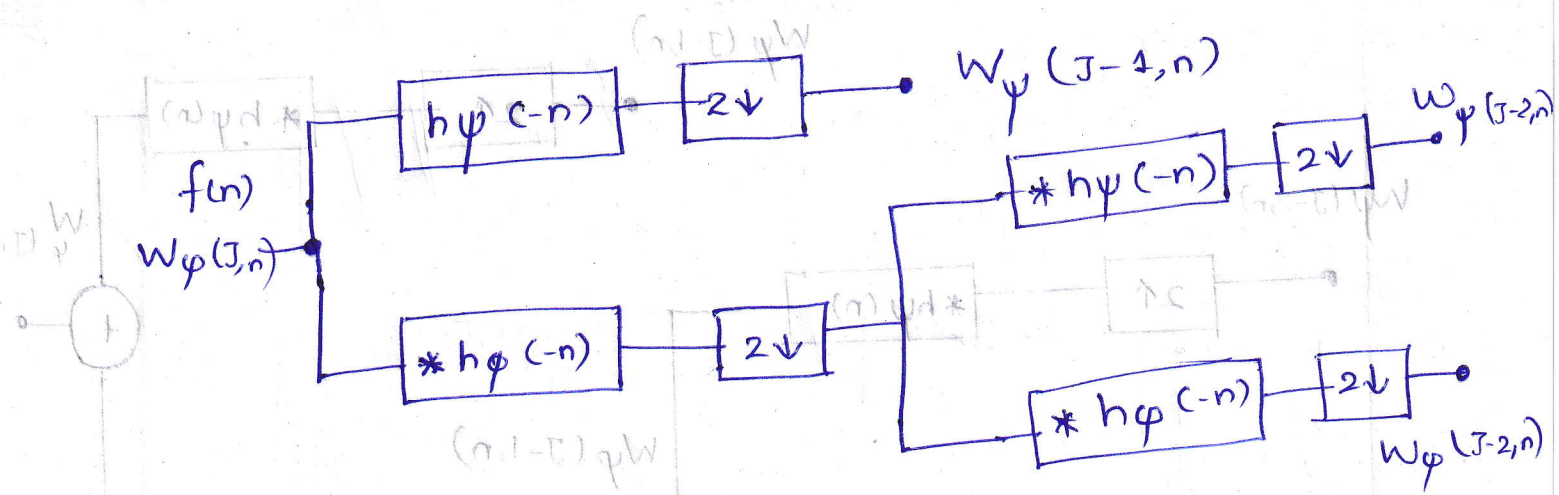


Figure 7.18: (a) A two-stage or two-scale FWT analysis bank (b) its frequency splitting characteristics.

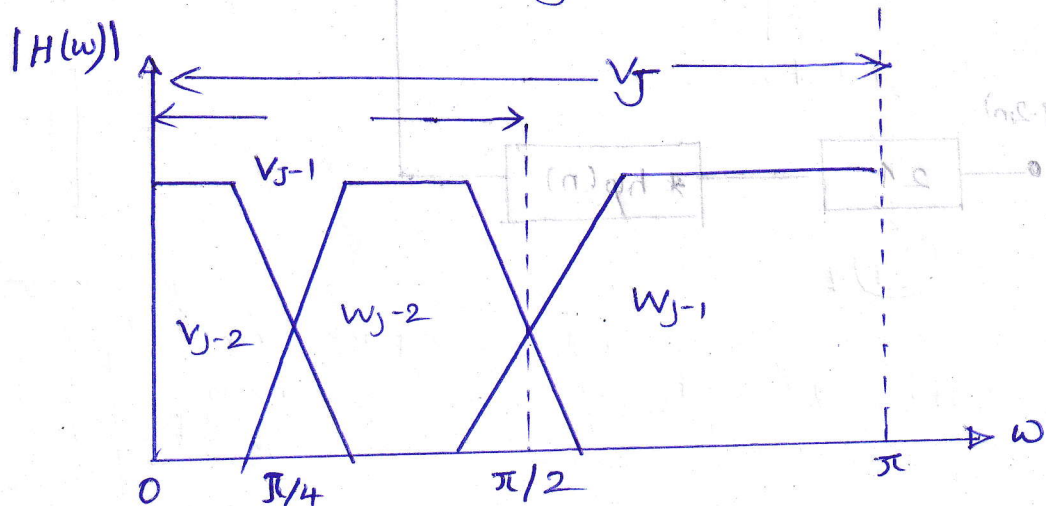


Figure 7.20 : The FWT^{-1} Synthesis filter bank

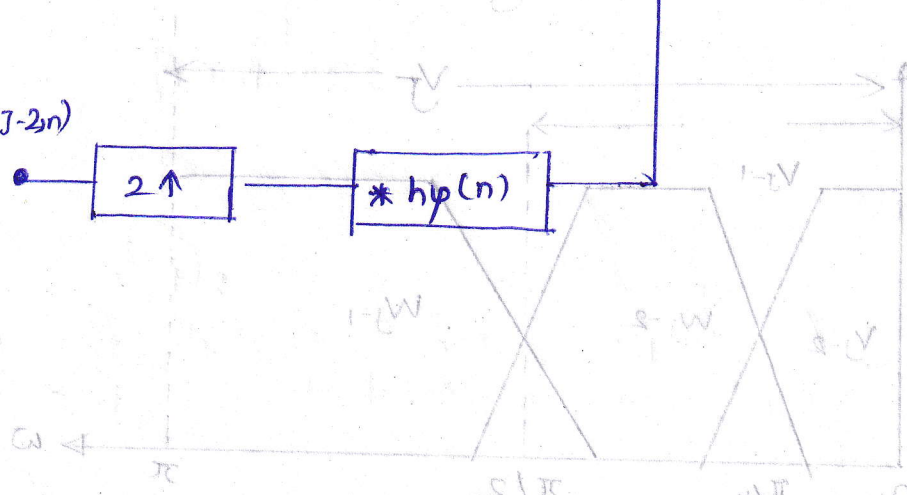
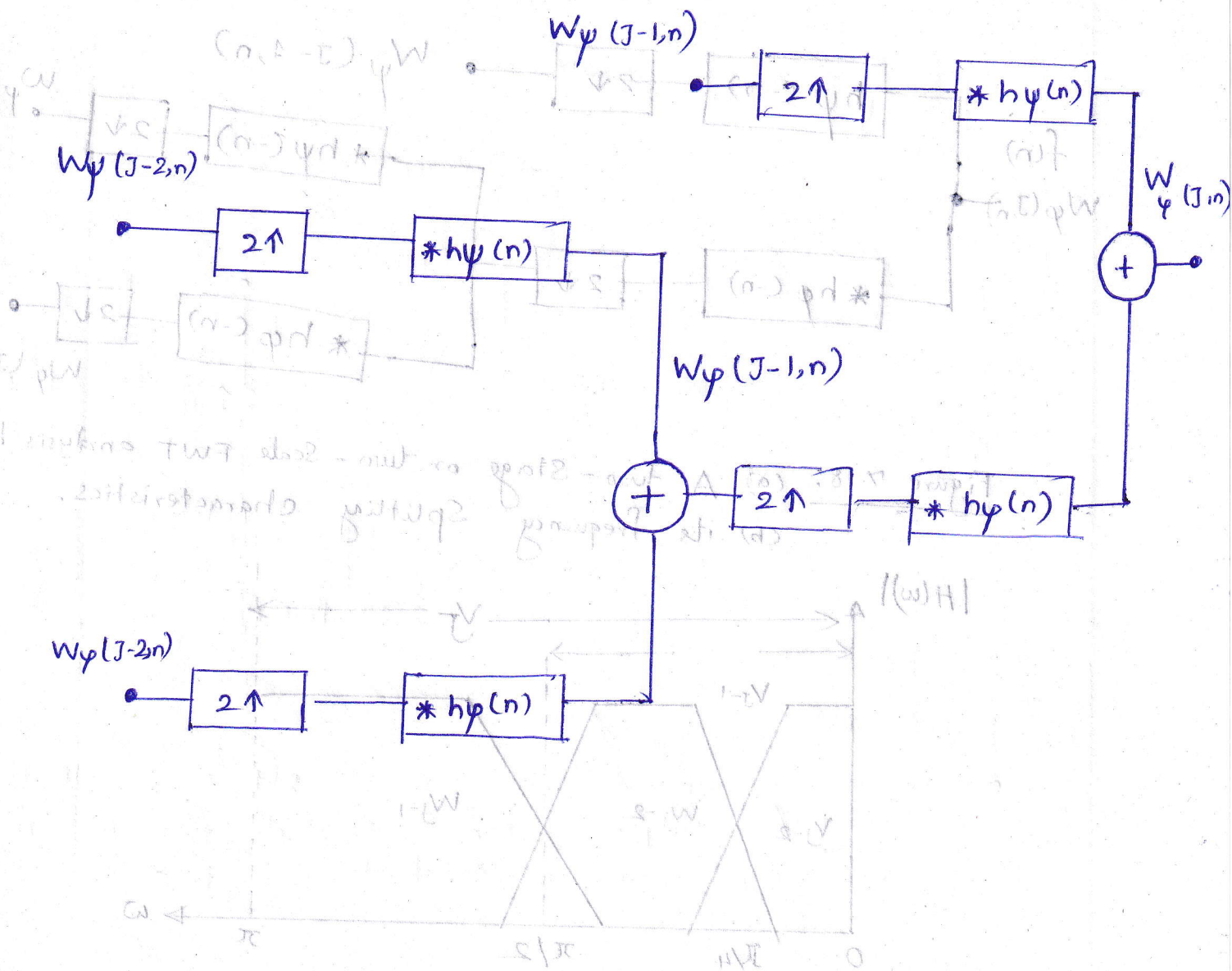
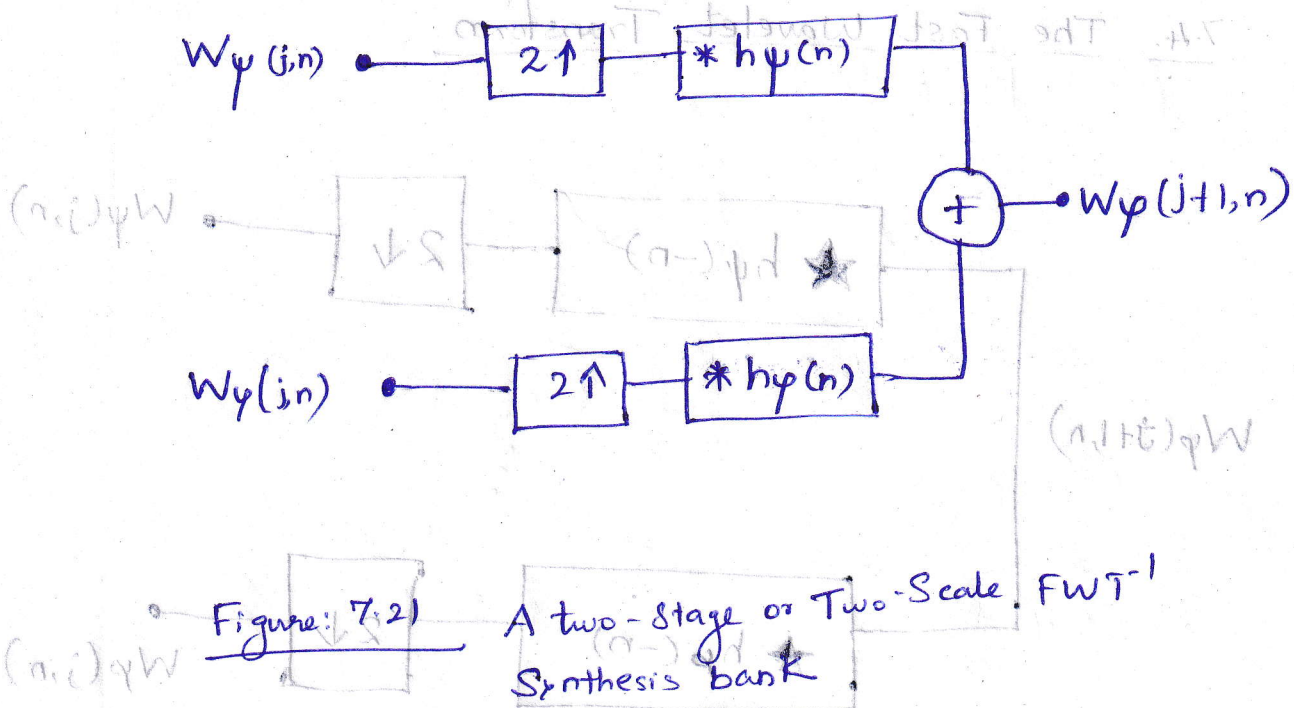
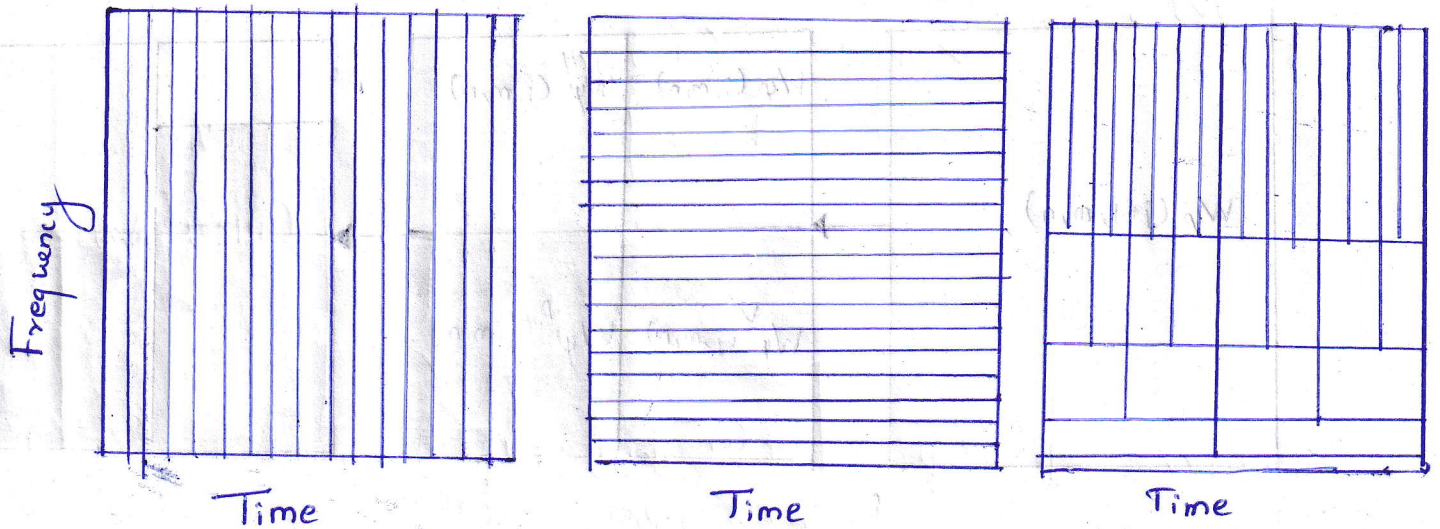


Figure 7.23: Time-frequency for the basis functions associated with (a) Sampled data (b) the FFT (c) the FWT. Note that the horizontal strips of equal height rectangles in (c) represent FWT scales.



7.5 Wavelet Transforms in Two Dimensions

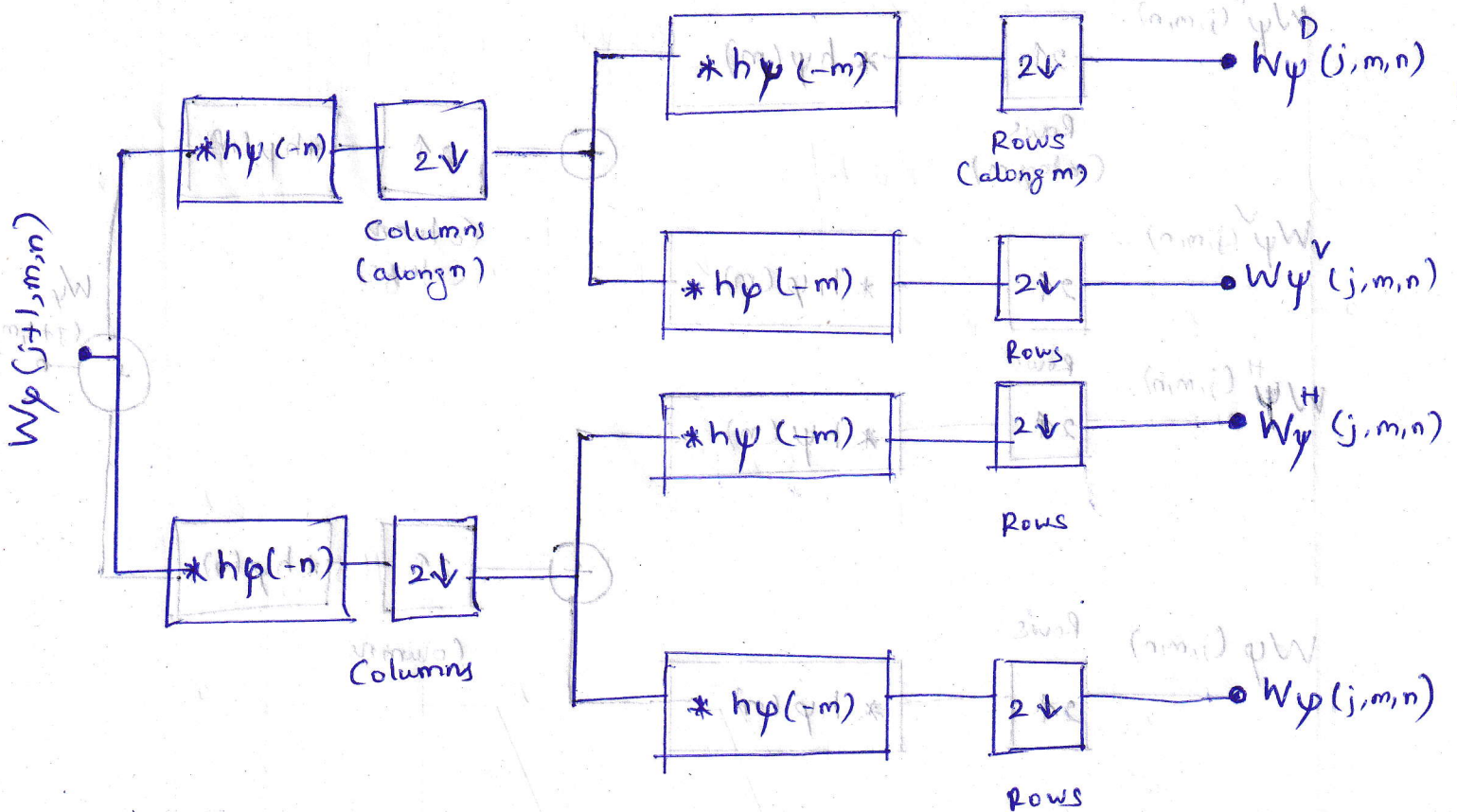
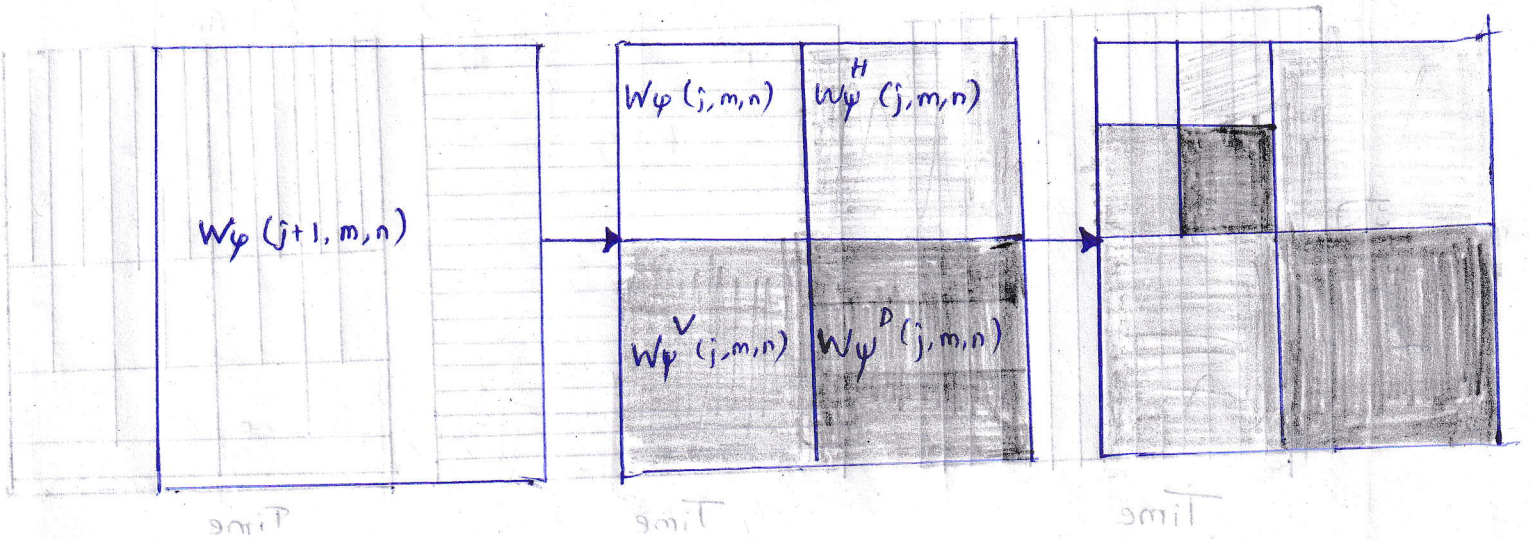


Figure: 7.24 The 2-D fast Wavelet Transform:
 (a) The Analysis filter bank

Figure 2.23: Time-frequency to the basis functions associated with (a) ... (b) The Resulting decomposition; ... (c) The Analysis filter bank



(c) The Synthesis filter bank

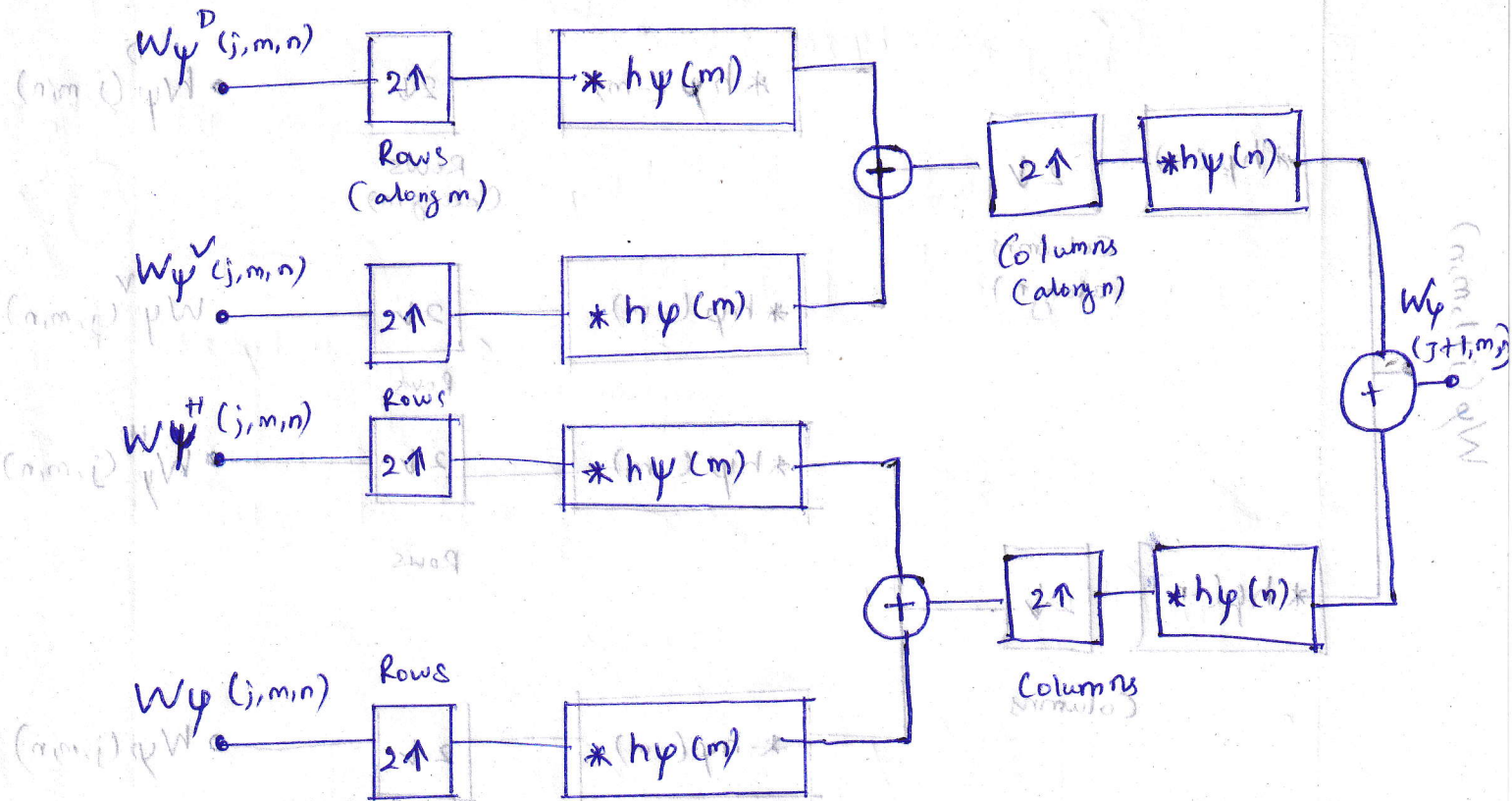


Figure 2.24: The 2-D fast wavelet transform: (a) The Analysis filter bank