Vi fant for den stykkevis lineære wavelet:

$$\left.\begin{aligned}\phi_{0,n} &= \frac{1}{\sqrt{2}}\left(\frac{1}{2}\phi_{1,2n-1} + \phi_{1,2n} + \frac{1}{2}\phi_{1,2n+1}\right)\\ \psi_{0,n} &= \frac{1}{\sqrt{2}}\phi_{1,2n+1}\end{aligned}\right\} \text{IDWT}$$

$$\left.\begin{aligned}\phi_{1,2n} &= \sqrt{2}\left(-\frac{1}{2}\psi_{0,n-1} + \phi_{0,n} - \frac{1}{2}\psi_{0,n}\right)\\ \phi_{1,2n+1} &= \sqrt{2}\,\psi_{0,n}\end{aligned}\right\} \text{DWT}$$

Filtrene blir: $G_0 = \frac{1}{\sqrt{2}}\{\frac{1}{2}, \underline{1}, \frac{1}{2}\}$

$G_1 = \frac{1}{\sqrt{2}}\{1\}$

$$\lambda_{G_0}(\omega) = \frac{1}{\sqrt{2}}\left(\frac{1}{2}e^{i\omega} + 1 + \frac{1}{2}e^{-i\omega}\right) = \frac{1}{\sqrt{2}}(\cos\omega + 1)$$

$$\lambda_{G_1}(\omega) = \frac{1}{\sqrt{2}}$$

H_0 og H_1:

$$H_0 : \sqrt{2}\begin{pmatrix} 1 & 0 & 0 & \cdots \\ 0 & 1 & 0 & \cdots \\ 0 & 0 & 1 & \cdots \\ & & & \end{pmatrix} = \underline{\underline{\sqrt{2}I}}$$

$$H : \sqrt{2}\begin{pmatrix} 1 & 0 & \cdots \\ -\frac{1}{2} & 1 & \cdots \\ 0 & 0 & \\ \vdots & \vdots & \\ 0 & & \\ -\frac{1}{2} & 0 & \cdots \end{pmatrix}$$

$$H_1 : \sqrt{2}\begin{pmatrix} 1 & -\frac{1}{2} & 0 & \cdots & 0 & -\frac{1}{2} \\ -\frac{1}{2}, & 1, & -\frac{1}{2}, & 0 \cdots & & 0 \\ 0, & -\frac{1}{2}, & 1, & -\frac{1}{2}, & 0 \cdots & 0 \end{pmatrix}$$

$$\underline{\underline{H_1 = \sqrt{2}\{-\frac{1}{2}, \underline{1}, -\frac{1}{2}\}}}$$

Oppgave 6.4 – 6.7:

6.4: $H = \begin{pmatrix} \frac{1}{5} & \frac{1}{5} & \frac{1}{5} & 0 & \cdots & 0 & \frac{1}{5} & \frac{1}{5} \\ -\frac{1}{3} & \frac{1}{3} & -\frac{1}{3} & 0 & \cdots & & 0 & 0 \\ & & & \vdots & & & & \end{pmatrix}$ $H_0 = ?$ $H_1 = ?$

Vi hadde at $\phi_{0,n} = \frac{1}{\sqrt{2}}\left(\frac{1}{2}\phi_{1,2n-1} + \phi_{1,2n} + \frac{1}{2}\phi_{1,2n+1}\right)$

Får nå i tillegg at

$$\hat{\psi}_{0,n} = \psi_{0,n} - \frac{1}{4}\left(\phi_{0,n} + \phi_{0,n+1}\right)$$

$$1 - \frac{1}{8} - \frac{1}{8}$$

$$= \frac{1}{\sqrt{2}}\underline{\phi_{1,2n+1}} - \frac{1}{4}\left(\frac{1}{\sqrt{2}}\left(\frac{1}{2}\phi_{1,2n-1} + \phi_{1,2n} + \underline{\frac{1}{2}\phi_{1,2n+1}}\right)\right)$$

$$- \frac{1}{4}\left(\frac{1}{\sqrt{2}}\left(\frac{1}{2}\underline{\phi_{1,2n+1}} + \phi_{1,2n+2} + \frac{1}{2}\phi_{1,2n+3}\right)\right)$$

$$= \frac{1}{\sqrt{2}}\left(-\frac{1}{8}\phi_{1,2n-1} - \frac{1}{4}\phi_{1,2n} + \frac{3}{4}\phi_{1,2n+1} - \frac{1}{4}\phi_{1,2n+2} - \frac{1}{8}\phi_{1,2n+3}\right)$$

$$\Rightarrow G_1 = \frac{1}{\sqrt{2}}\left\{-\frac{1}{8}, -\frac{1}{4}, \underline{\frac{3}{4}}, -\frac{1}{4}, -\frac{1}{8}\right\}$$

$$\lambda_{G_1}(\omega) = \frac{1}{\sqrt{2}}\left(-\frac{1}{8}e^{2i\omega} - \frac{1}{4}e^{i\omega} + \frac{3}{4} - \frac{1}{4}e^{-i\omega} - \frac{1}{8}e^{-2i\omega}\right)$$