Seasonal Models

Example: Full Fourier Model with $p = 5$

In this case the Fourier frequencies are $\omega_1 = 2\pi/5$ and $\omega_2 = 4\pi/5$ and so $p = 2 \times 3 - 1$. Then, $m = 3$ and $\boldsymbol{\theta}_t = (\theta_{t,1}, \ldots, \theta_{t,4})'$, $\boldsymbol{F} = (1, 0, 1, 0)$, $\boldsymbol{G}$ is given by

$$\boldsymbol{G} = \begin{pmatrix} \cos(2\pi/5) & \sin(2\pi/5) & 0 & 0 \\ -\sin(2\pi/5) & \cos(2\pi/5) & 0 & 0 \\ 0 & 0 & \cos(4\pi/5) & \sin(4\pi/5) \\ 0 & 0 & -\sin(4\pi/5) & \cos(4\pi/5) \end{pmatrix},$$

and the forecast function is

$$f_t(h) = A_{t,1}\cos(2\pi h/5 + \gamma_{t,1}) + A_{t,2}\cos(4\pi h/5 + \gamma_{t,2}).$$