$$ext{F} = rac{1}{\sqrt{N}} egin{bmatrix} 1 & 1 & 1 & \cdots & 1 \ 1 & \omega & \omega^2 & \omega^3 & \cdots & \omega^{N-1} \ 1 & \omega^2 & \omega^4 & \omega^6 & \cdots & \omega^{2(N-1)} \ 1 & \omega^3 & \omega^6 & \omega^9 & \cdots & \omega^{3(N-1)} \ dots & dots & dots & dots & dots \ 1 & \omega^{N-1} & \omega^{2(N-1)} & \omega^{3(N-1)} & \cdots & \omega^{(N-1)(N-1)} \ \end{bmatrix},$$