

9.48 Repeat Problem 9.46 for a nine-element array.

Solution: Using Eq. (9.121),

$$F_{\text{an}}(\theta) = \frac{\sin^2[(N\pi d/\lambda)\cos\theta]}{N^2 \sin^2[(\pi d/\lambda)\cos\theta]} = \frac{\sin^2[(27\pi/4)\cos\theta]}{81 \sin^2[(3\pi/4)\cos\theta]}$$

and this pattern is shown in Fig. P9.43. The peak values of the pattern occur at $\theta = \pm 90^\circ$. From numerical values of the pattern, the angles at which $F_{\text{an}}(\theta) = 0.5$ are approximately 3.8° on either side of the peaks. Hence, $\beta \approx 7.6^\circ$.

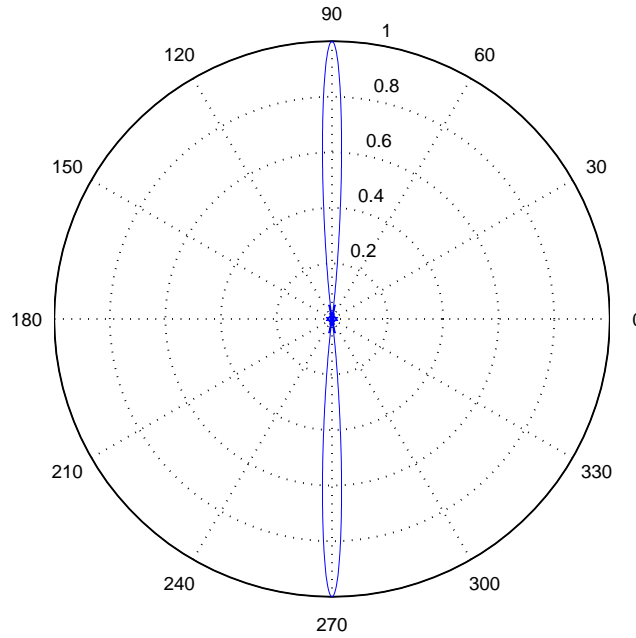


Figure P9.48: Normalized array pattern of a five-element array with uniform amplitude distribution in Problem 9.48.