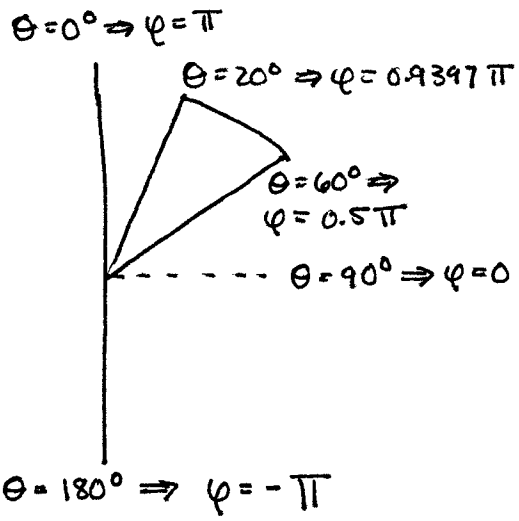
Problem 3.3.2

$$AF(\theta) = \begin{cases} 0.342\,\csc(\theta) & 20^\circ \le \theta \le 60^\circ \\ 0 & \text{elsewhere} \end{cases}$$



$$\varphi = \frac{2\pi d}{\lambda}\cos\theta = \pi\cos\theta \quad \text{for } d = \lambda/2$$

$$\csc(\theta) = \frac{1}{\sin\theta} = \frac{1}{\sqrt{1-(\varphi/\pi)^2}}$$

$$B_d(\varphi) = \begin{cases} 0.342\,\dfrac{1}{\sqrt{1-(\varphi/\pi)^2}} & 0.5\pi \le \varphi \le 0.9397\pi \\ 0 & \text{otherwise} \end{cases}$$

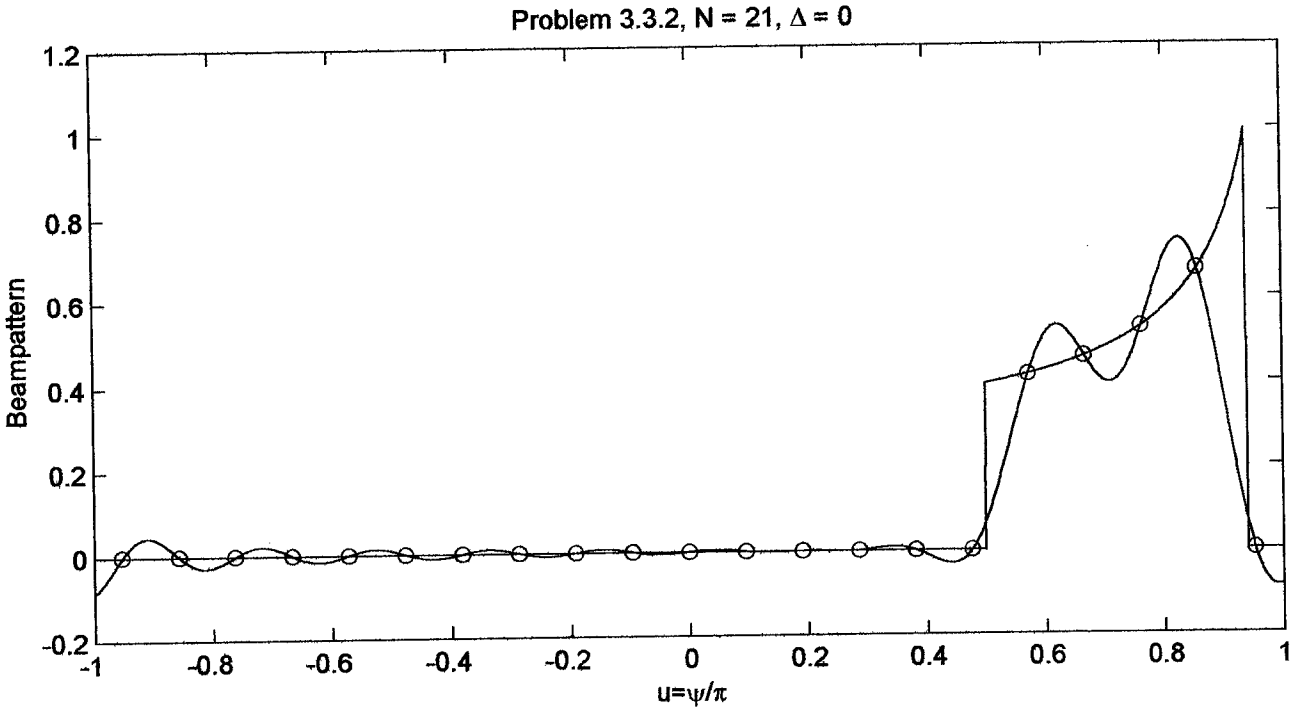
for $N=21$, sample at

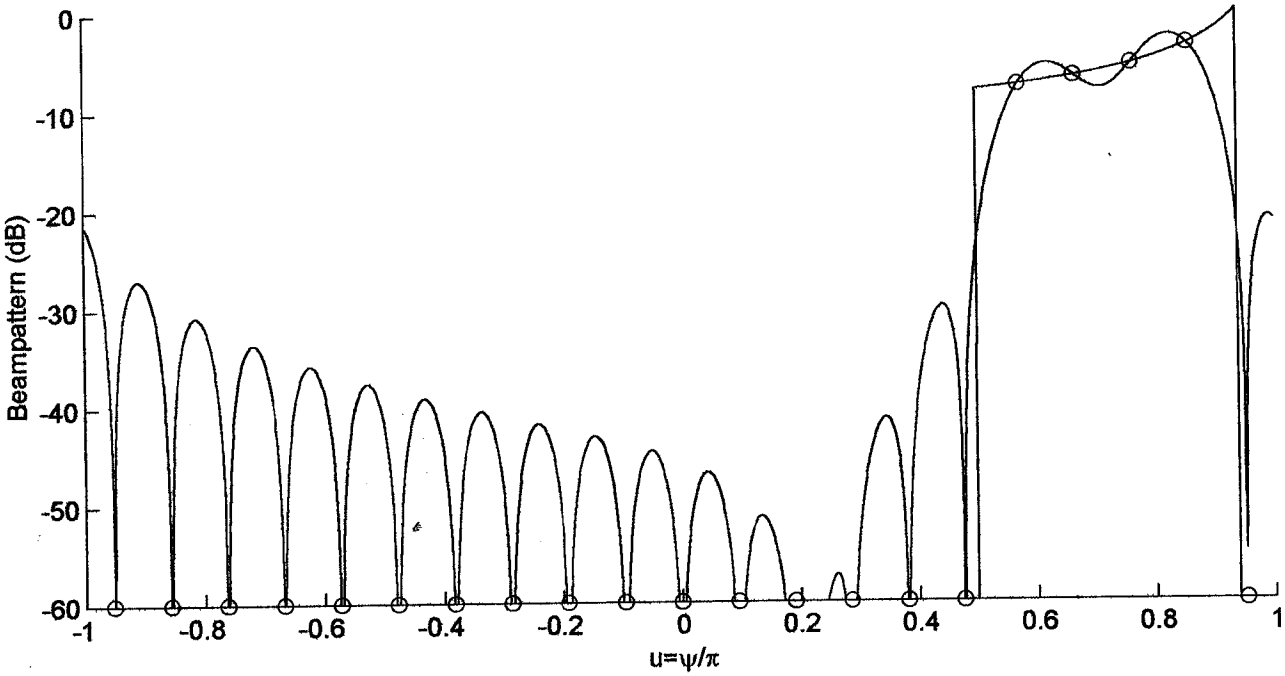
$$\varphi_k = (k-10+\Delta)\frac{2\pi}{21} \qquad k = 0, 1, \ldots, 21$$

$0 \le \Delta \le 1$ is sampling offset

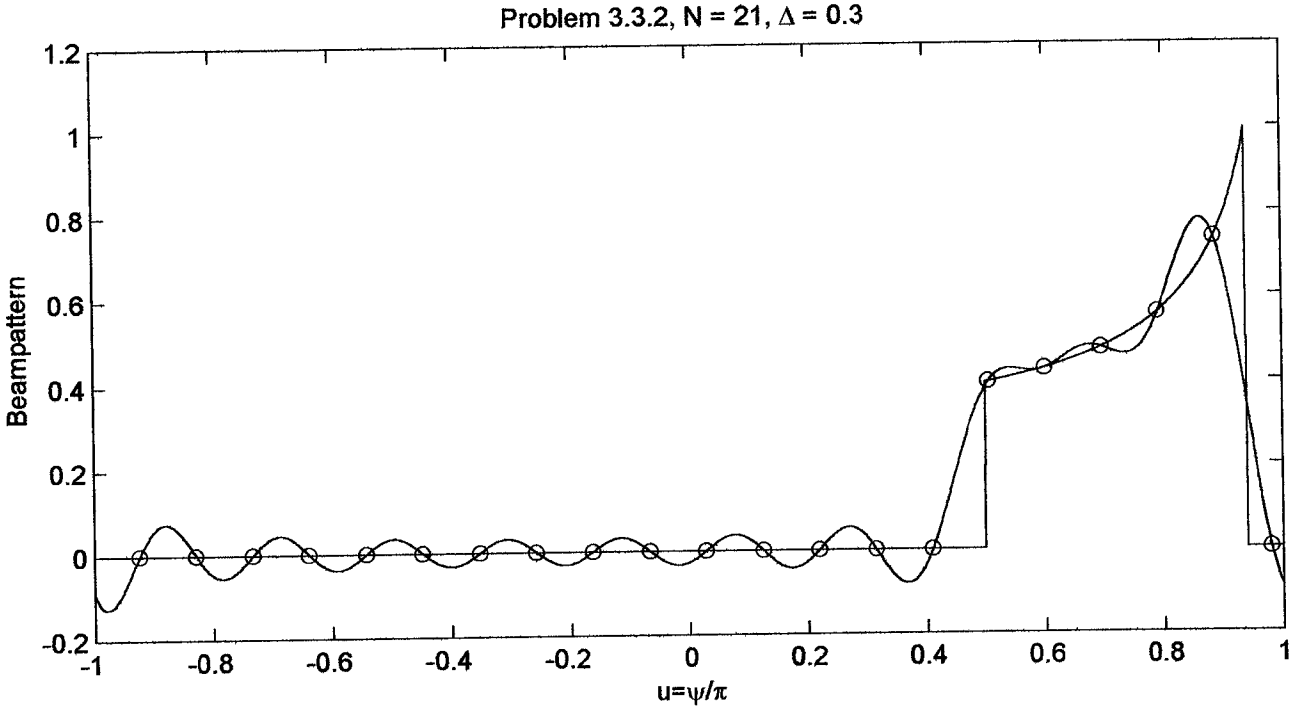
- beampatterns shown for $\Delta=0$, $\Delta=0.3$

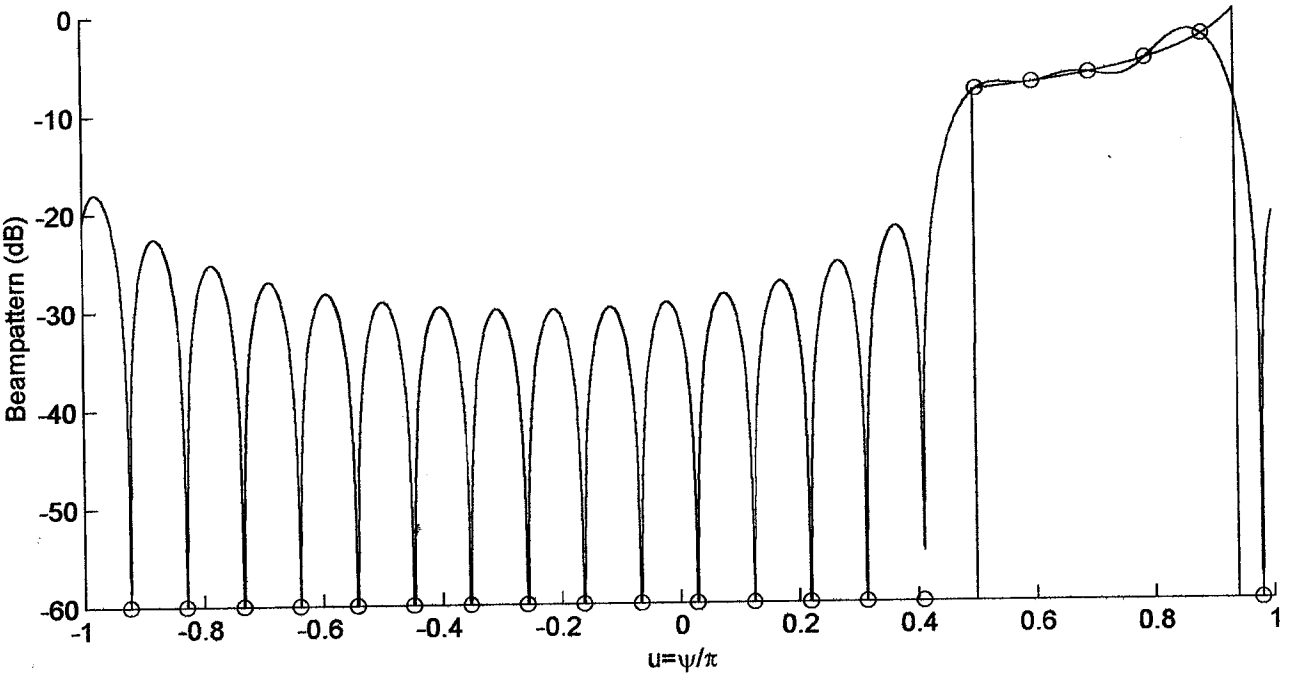
3.3.2 (2)





3.3.2 ③


Problem 3.3.2, N = 21, Δ = 0.3
Beampattern
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
u=ψ/π


Beampattern (dB)
0
-10
-20
-30
-40
-50
-60
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
u=ψ/π