Problem 2.4.9

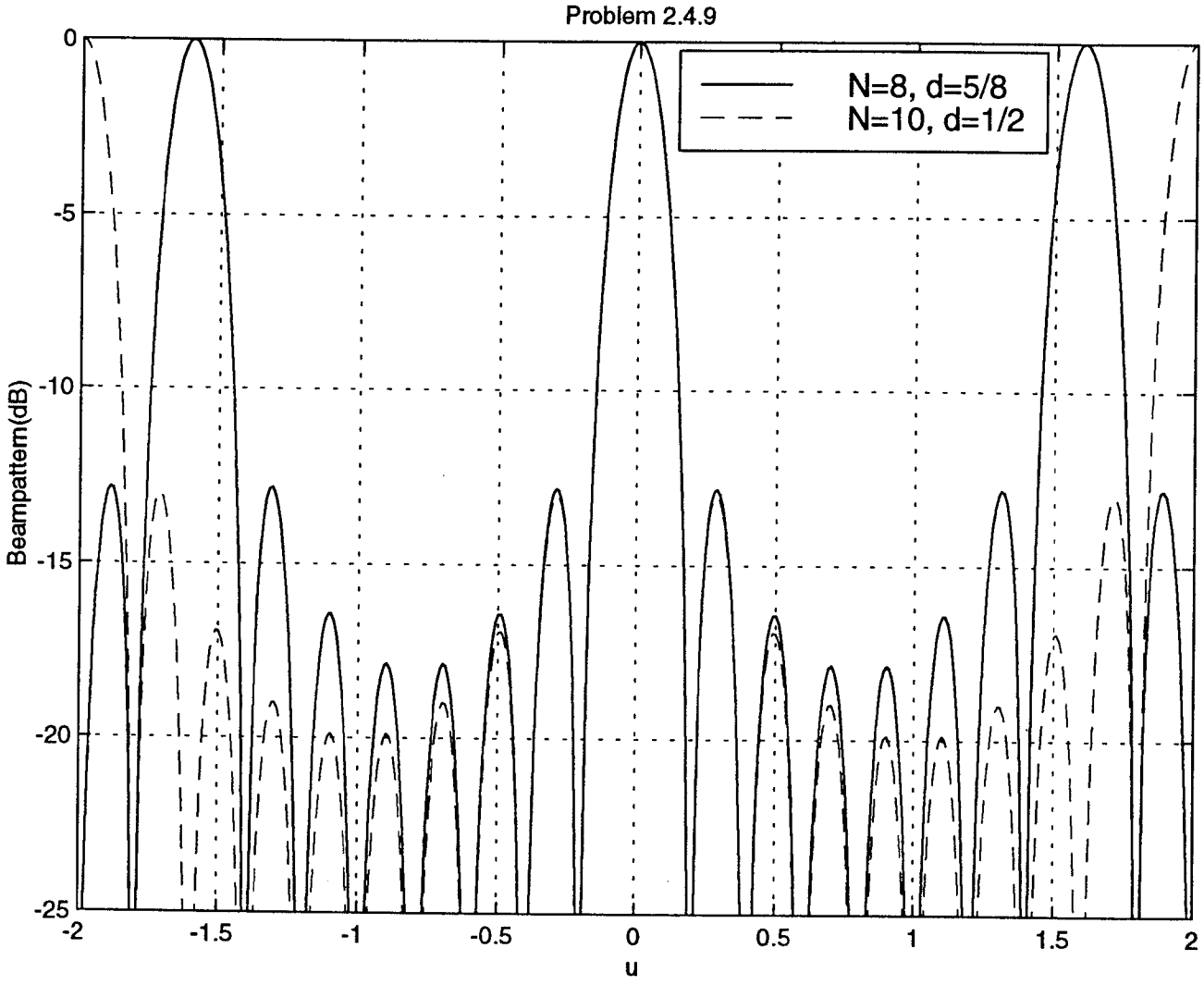
$$B(\varphi) = \frac{\sin\left(\frac{N}{2}\varphi\right)}{N\sin(\varphi/2)} \qquad \varphi = 2\pi\frac{d}{\lambda}u$$

(i) $N=8$, $d=\frac{5}{8}\lambda$ $\quad \varphi = \frac{5}{4}\pi u$ $\quad B_8(u) = \dfrac{\sin(5\pi u)}{8\sin\left(\frac{5}{8}\pi u\right)}$

(ii) $N=10$, $d=\frac{1}{2}\lambda$ $\quad \varphi = \pi u$ $\quad B_{10}(u) = \dfrac{\sin(5\pi u)}{10\sin\left(\frac{1}{2}\pi u\right)}$

The beampattern (really frequency-wavenumber response) is plotted for $u \in [-3, 3]$. The two beampatterns are nearly identical near the mainlobe and first sidelobes, but the $N=8$ beampattern has a period of $\frac{\lambda}{d} = \frac{8}{5} = 1.6$ in u-space, while the $N=10$ beampattern has a period of 2 in u-space.

2.4.9 (2)


Problem 2.4.9
N=8, d=5/8
N=10, d=1/2
Beampattern(dB)
0
-5
-10
-15
-20
-25
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
u