IN-CLASS PROBLEM

SUPPOSE THAT YOU ARE WORKING WITH A LINEAR SONAR ARRAY. IT HAS 25 SENSORS WITH 2 METER SPACING. YOU WANT TO RECEIVE NARROWBAND SIGNALS WITH CENTER FREQUENCY OF 75 Hz. THE SPEED OF SOUND UNDERWATER IS 1500 M/S.

a) ASSUMING A UNIFORMLY-WEIGHTED ARRAY, WHAT IS THE MAINLOBE WIDTH OF THE FREQ-WAVENUMBER RESPONSE? GIVE YOUR ANSWER IN TERMS OF k_z.

b) SUPPOSE YOU WANT TO INCREASE THE RESOLUTION OF THE ARRAY. WHICH OF THE FOLLOWING WOULD YOU DO:

i) ADD SENSORS, KEEPING THE OVERALL LENGTH OF THE ARRAY (i.e, LENGTH OF CABLE SENSORS ARE ON) THE SAME.

ii) KEEP SAME NUMBER OF SENSORS, BUT SPREAD THEM OUT OVER A LONGER CABLE.

EXPLAIN. IS THERE A LIMIT TO # OF SENSORS AND/OR LENGTH OF CABLE THAT SHOULD BE USED?