SPARSE ARRAY TECHNOLOGY
FOR 3D SONAR IMAGING SYSTEMS

• Broadband Ultra-sparse Acoustic Arrays

• Final planar array 225 elements over 256 \( \lambda \times 256 \lambda \) area

• Bandwidth: 30% of center frequency, \( F_0 \)

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**Sparse Array Technology for 3D Sonar Imaging Systems**

**Naval Undersea Warfare Center**

**DARPA, Air-Coupled Acoustic Microsensors Workshop held on August 24 and 25, 1999 in Crystal City, VA., The original document contains color images.**
BROADBAND BEAMPATTERN

\[ B(\Theta_x, \Theta_y) = \left( \sum_{i=0}^{M-1} w_i \cos(2\pi F_0 \tau_i) \frac{\sin(\pi \tau_i W)}{\pi \tau_i W} \right)^2 \]

\[ \tau_i = \frac{u x_i}{c} \]

source direction

ARRAY PLANE

\[ M = 5 \]
PROTOTYPE 1D ARRAY
THEORETICAL BEAMPATTERN

Final Beampattern on an expanded scale with revised weights R2
PROTOTYPE 1D ARRAY
ELEMENT LOCATIONS & WEIGHTS

Weights plotted against sensor positions with revised weights R2
PROTOTYPE SPARSE LINEAR ARRAY
ACOUSTIC TEST FACILITY

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