Investigation of a Curtain Antenna Array for TIGER

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Problems of currently used antennas

• Structural problem

  1. Broken long elements (wind 47 m/s)

  2. Tower bent along wind direction

  3. Twisted of horizontal boom

• Questioning of antenna performance
Objectives

- Modification of the Log periodic antenna to achieve a robust structural that requires minimal maintenance.

- Implementation of frequency independent array to ensure a broadband operation.
Possibility of compact LPDA

\[ \alpha_{0.2} = \tan^{-1} \left( \frac{1 - \tau}{4\sigma} \right) \]

\[ \tau = \frac{l_{n+1}}{l_n} \]

\[ \sigma = \frac{S_{n,n+1}}{2l_n} \]
L/Alpha/Bs relationship

\[ L/\alpha/Bs \text{ relationship} \]

\[ Bs = 3.46 \]

\[ Bs = 2 \]
A Different Approach

\[ \frac{S_{1,2}}{L} = \frac{1 - \tau}{1 - \tau^{N-1}} \]
Bs/Tau/N/S₁/L relationship
3D Antenna pattern chejbf14p.dat
Control of electrical height

Longest dipole ($f_{\text{min}}$)

Shortest dipole ($f_{\text{max}}$)

$h$ and $h \frac{f_{\text{min}}}{f_{\text{max}}}$
Dipole over ground
Inverted-V dipole over ground
New LPDA Structure
Gain over 8-20 MHz band
Smith Chart and VSWR

VSFR of lp8ml.nec

VSFR

MHz
Lp8m1f8c.dat
Lp8m1f14c.dat
Vertical pattern of lp8m1fl 7 dB G=8.39 dB, F/B=20.66 dB (theta=68, phi=0)
Lp8m1f20c.dat
LPDA Linear Array

• Non constant electrical spacing

• Variation of gain

• Impedance effects

• Beamwidth variation
Electrical Spacing
Beamwidth Variation
Semi-Circular Array
Conclusion

- Inverted-V LPDA
- Implementation of semi-circular array
Fig. 10

Tilting rotatable log-periodic array

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