FEKO & HFSS beam comparison

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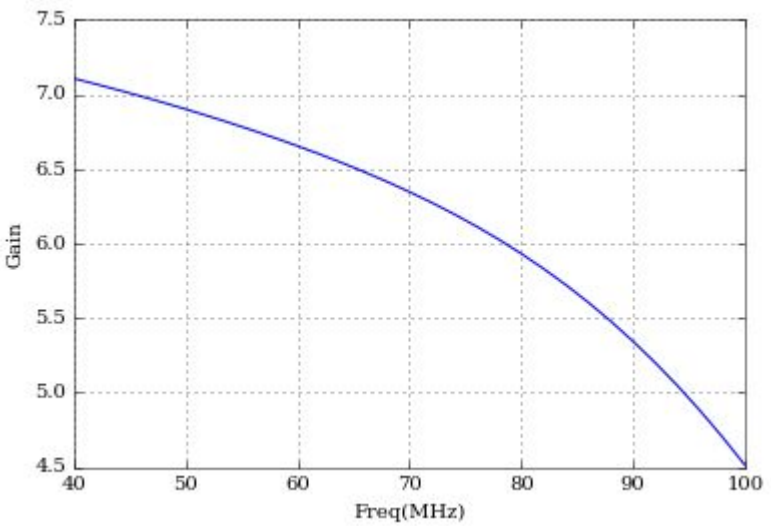
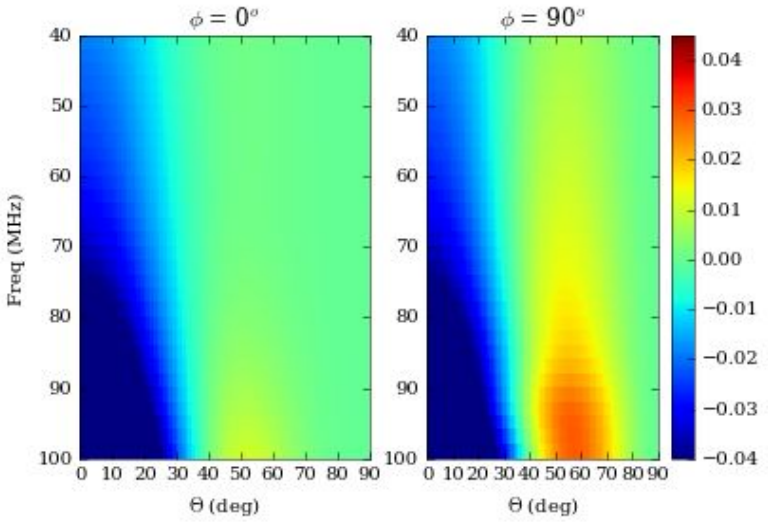
FEKO results - PEC ground

- The FEKO simulation was carried out for the lowband system between 40 - 100 MHz.
- No balun or shield structure was used.
- The ground was assumed to be PEC to infinity.

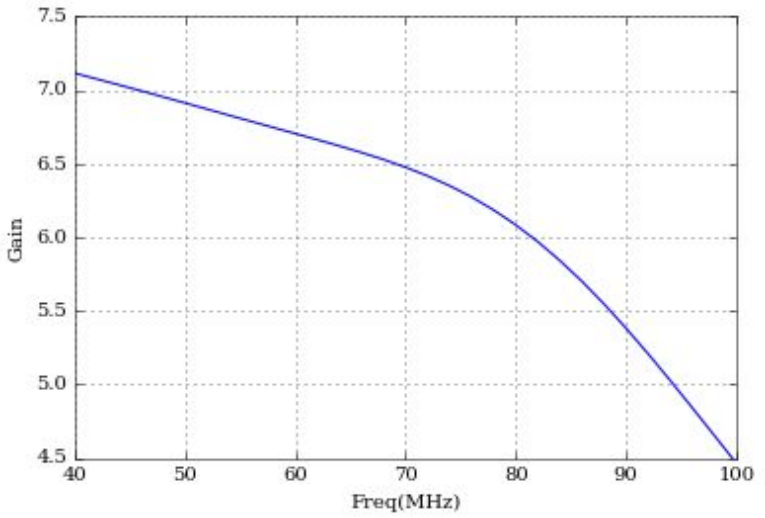


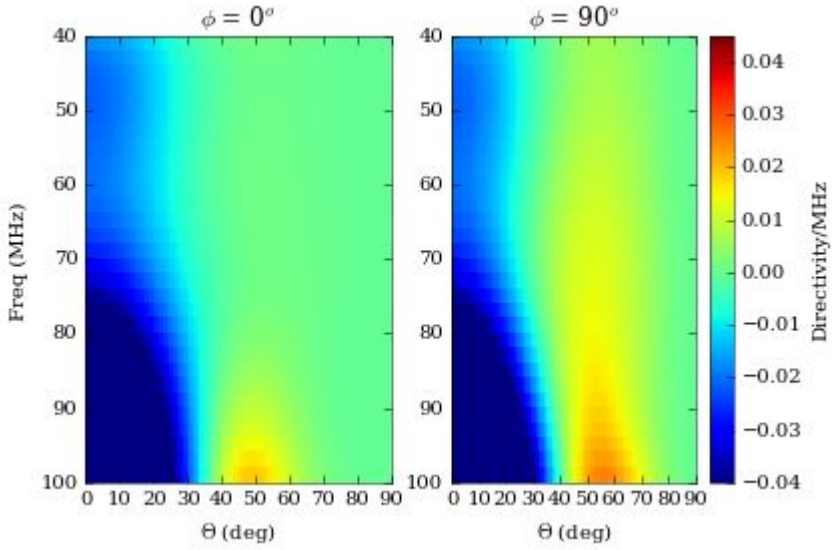
- *The top graph is gain versus Freq at theta = 0 & phi=0*
- *The bottom graph shows the change in absolute gain at every MHz for all values of theta*



HFSS results - PEC ground

- The HFSS simulation was carried out for the lowband system between 40 - 100 MHz.
- No balun or shield structure was used.
- The ground was assumed to be PEC to infinity.
- The default FEM solver was used. This requires a bounding box. Which was set to ƛ/4 of the largest wavelength.

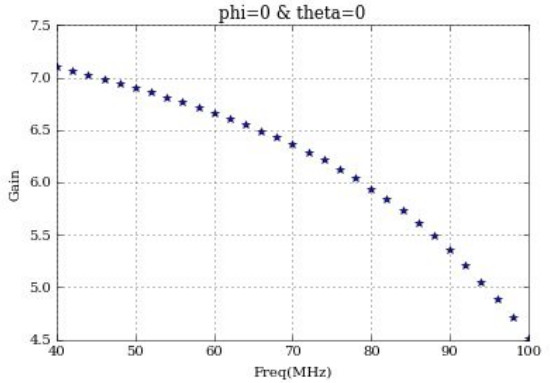


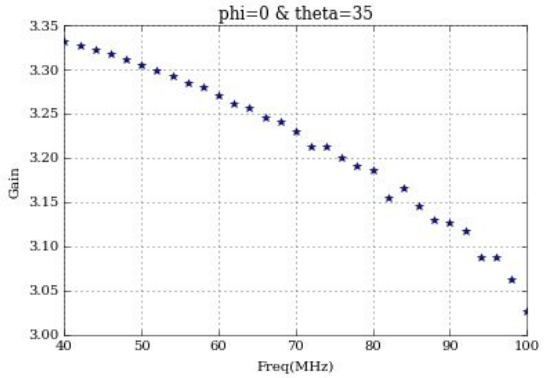


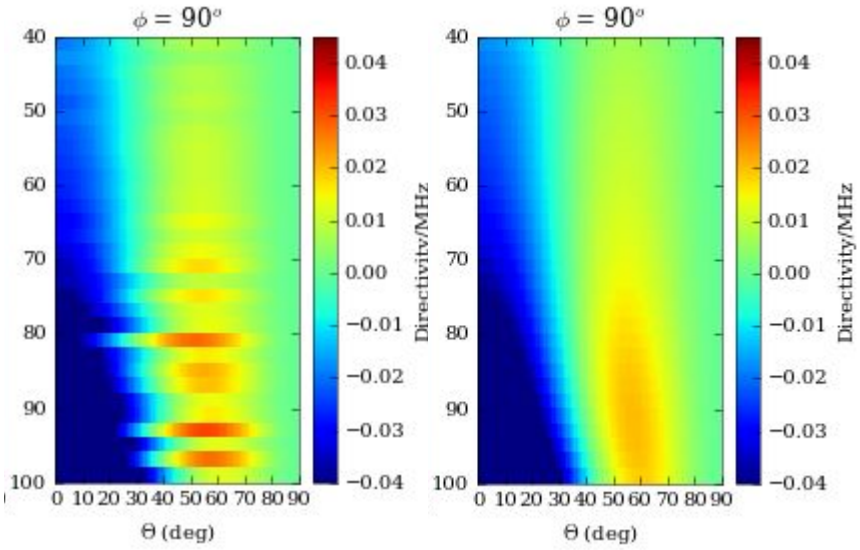
- *The top graph is gain versus Freq at theta = 0 & phi=0*
- *The bottom graph shows the change in absolute gain at every MHz for all values of theta*

HFSS IE results - PEC ground

- The HFSS simulation was carried out for the lowband system between 40 - 100 MHz.
- No balun or shield structure was used.
- The ground was assumed to be PEC to infinity.
- The **Integral Equation** solver was used. This is similar to the MOM solver of FEKO.
- *The top graph is gain versus Freq at theta = 0 & phi=0. The second plot is at theta=35 & phi=0.*
- *This solver results can result in non-physical variation between frequencies*
- *The bottom graph shows the change in absolute gain at every MHz for all values of theta at phi=90. Left is directly from the simulation. Right is a 7th order polynomial fit in frequency.*

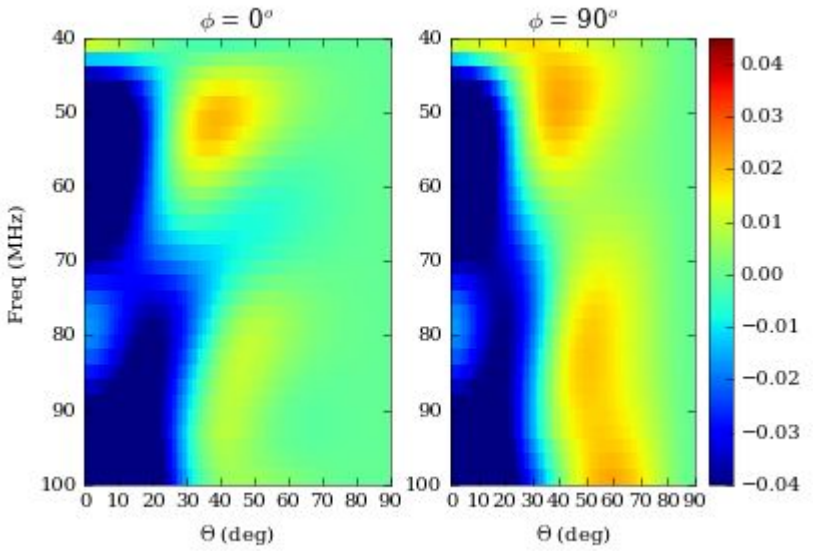




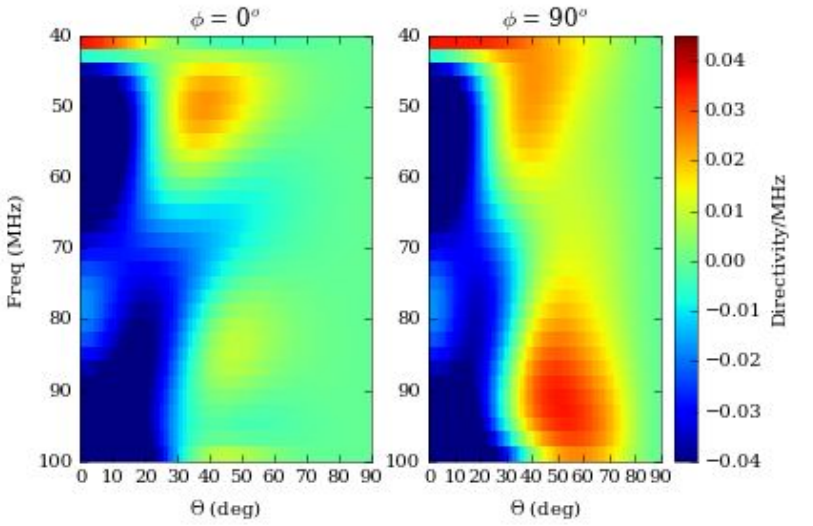


Real ground - FEKO & HFSS- IE

- The structure of the antenna is kept same as before.
- The ground plane is now a 10m X 10m PEC and below is soil with ϵ_r = 3.5 and σ = 2 * 10^{-2} S/m.

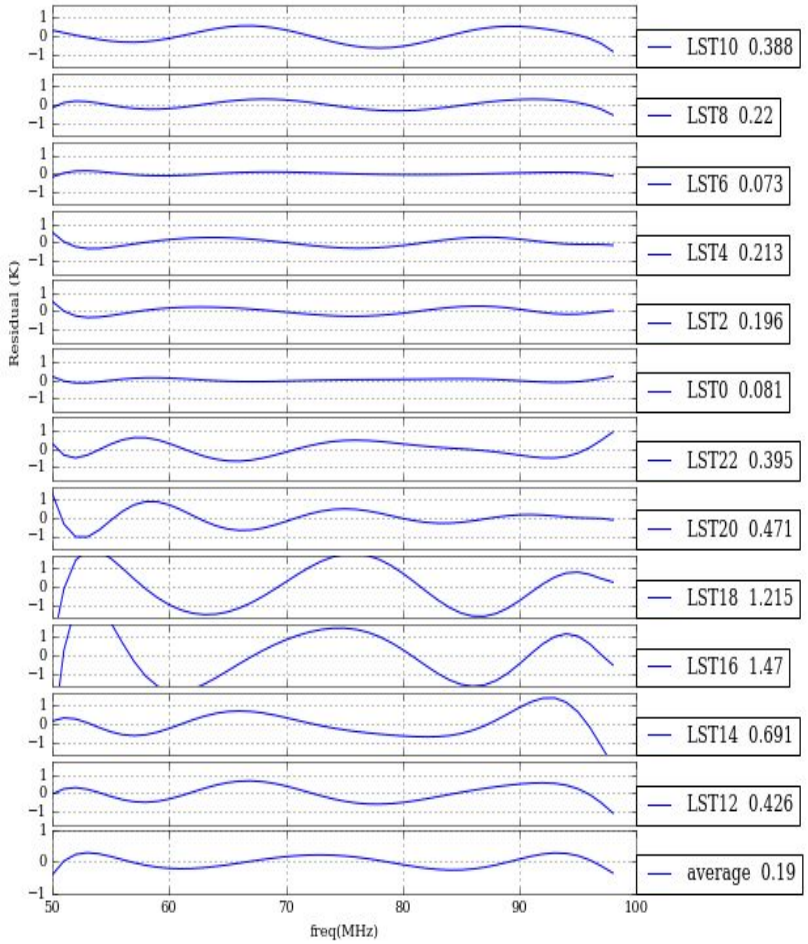


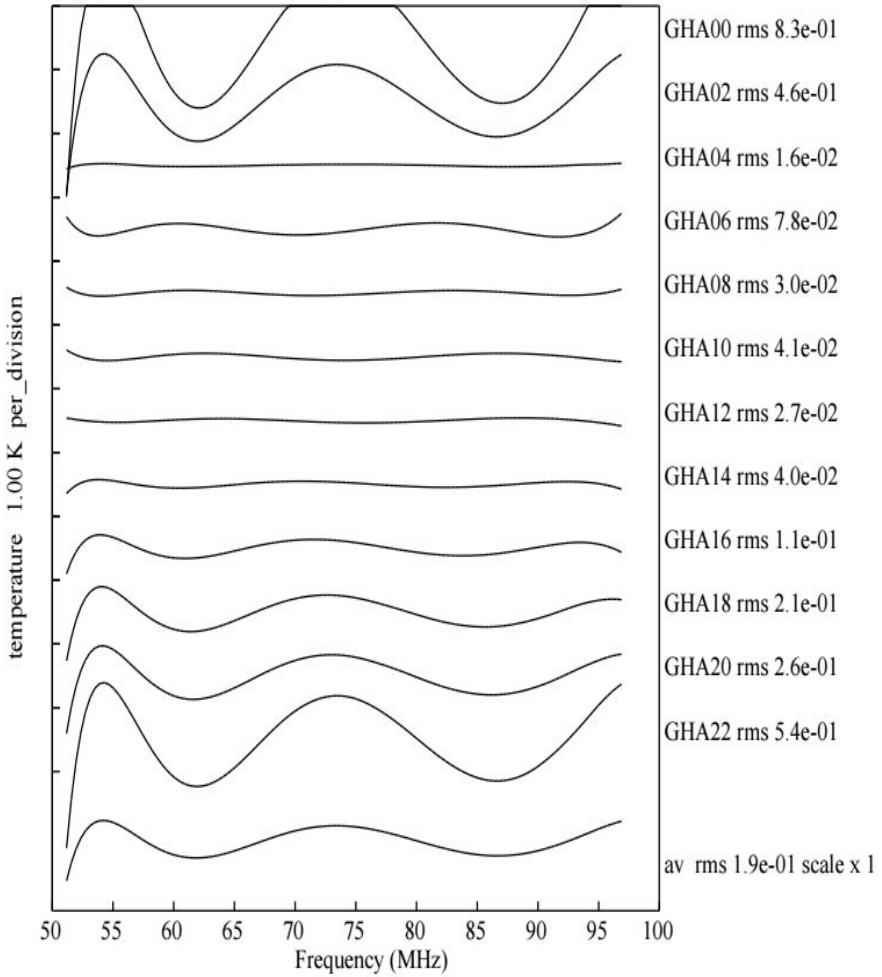
- *The top figure shows the gain derivative plots for the beam obtained using FEKO simulations*
- *The bottom plot shows the gain derivative plots for the beam obtained by fitting a 7th order polynomial fit in frequency to the HFSS-IE simulations*



Residues to beam fitting from real ground simulations- HFSS-IE

- HFSS-IE beam was convolved with a sky model. The skymodel used is the Haslam map scaled to 75 MHz with spectral index of -2.5.
- The data was averaged over 2 hour intervals. And a 5 term polynomial was fitted over the range 50-98MHz and residues are indicated.Also calculated and shown in the plots is the freq RMS of the residues over 50-98 MHz.
- *Shown below are two plots of residues obtained with the **same beam patterns**. The left plot corresponds to the results from my code and the right shows Alan's results.*





Residues to beam fitting from real ground simulations- FEKO

- FEKO beam was convolved with a sky model. The skymodel used is the Haslam map scaled to 75 MHz with spectral index of -2.5.
- The data was averaged over 2 hour intervals. And a 5 term polynomial was fitted over the range 50-98 MHz and residues are indicated. Also calculated and shown in the plots is the freq RMS of the residues over 50-98 MHz.
- *Shown below are two plots of residues obtained with the **same beam patterns**. The left plot corresponds to the results from my code and the right shows Alan's results*