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REACH Antenna Group
Weekly Meeting

01 August 2019

Departement Elektriese en Elektroniese Ingenieurswese
•
Department of Electrical and Electronic Engineering

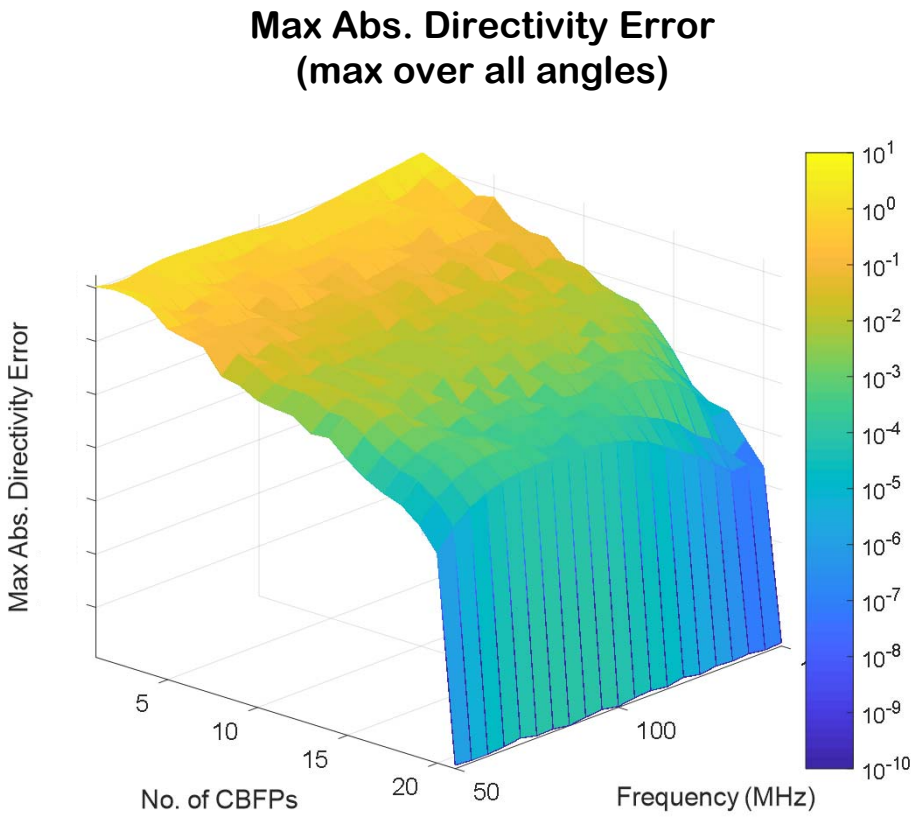
Overview

1. CBFP Error Analysis

2. Candidate Antenna Figures-of-Merit
    1. Elliptical Dipole (John) – Finite Ground
    2. Corrugated Horn (Iman) – Finite Ground
    3. Conical Sinuous (John) – Finite Ground

CBFP Directivity Error vs. No. of CBFPs Used (No Fit)

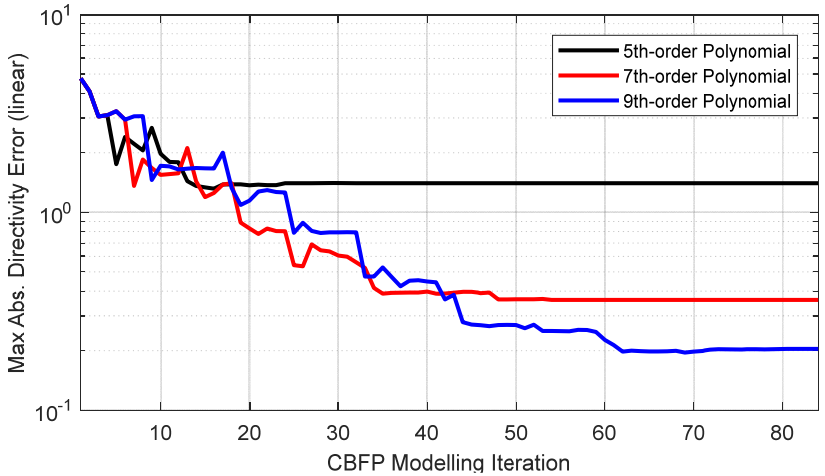
- Antenna: Conical Sinuous, Infinite Ground (John)
- No. of Frequencies: 21
- Max no. of CBFPs: 21
- Maximum directivity error taken over all frequencies and angles



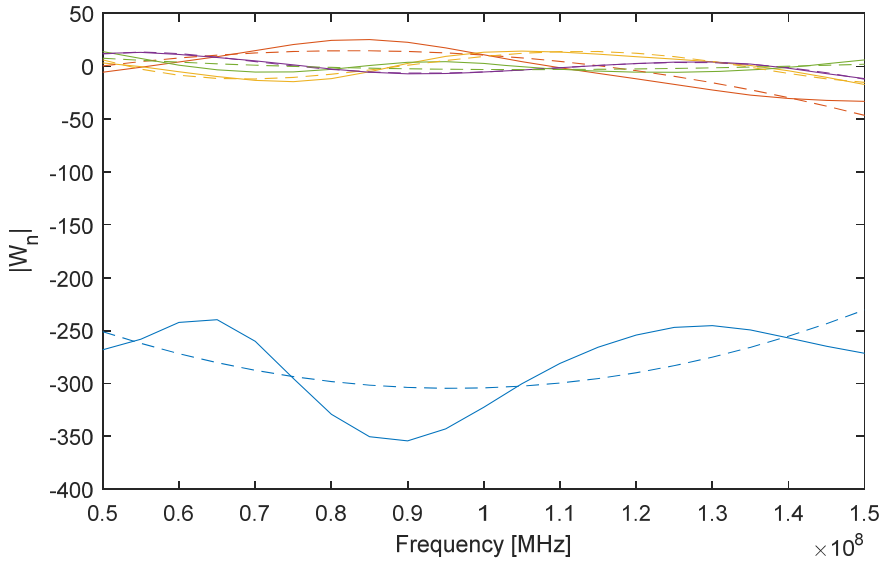
CBFP Coefficient Modelling

- Antenna: Conical Sinuous, Infinite Ground (John)
- No. of Frequencies: 21
- Max no. of CBFPs: 21
- Fit: Polynomial Regression

Max Directivity Error (angle, frequency) vs. Max CBFP Coeff. Fit Order



Final CBFP Coefficient Curves



True CBFP Coefficients

Best Polynomial Fits

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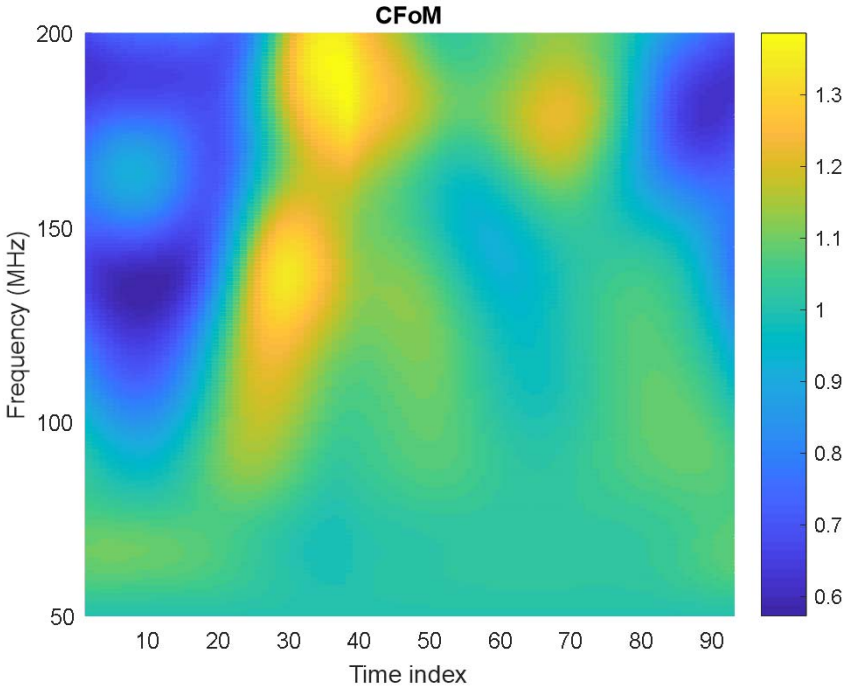
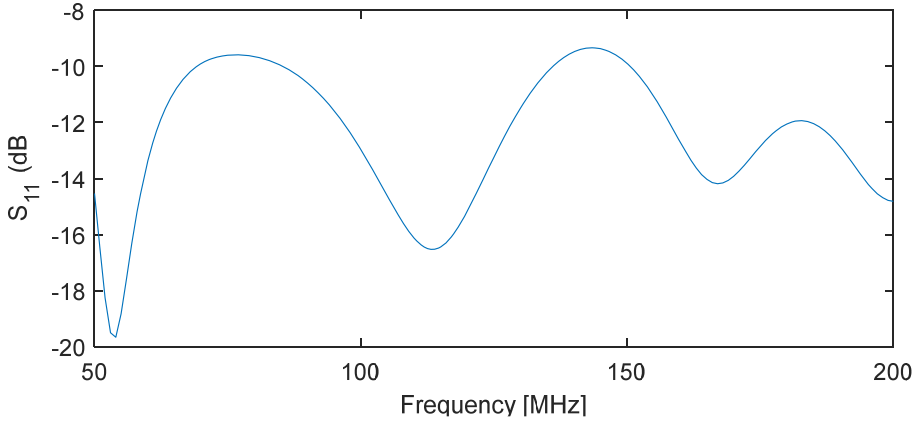
Elliptical Dipole – Chromaticity

$$C(\nu) = \frac{\int_\Omega B(\nu,\Omega)T(\nu_0,\Omega)d\Omega}{\int_\Omega B(\nu_0,\Omega)T(\nu_0,\Omega)d\Omega}$$

Far-Fields



Reflection Coefficient



Elliptical Dipole – Chromaticity

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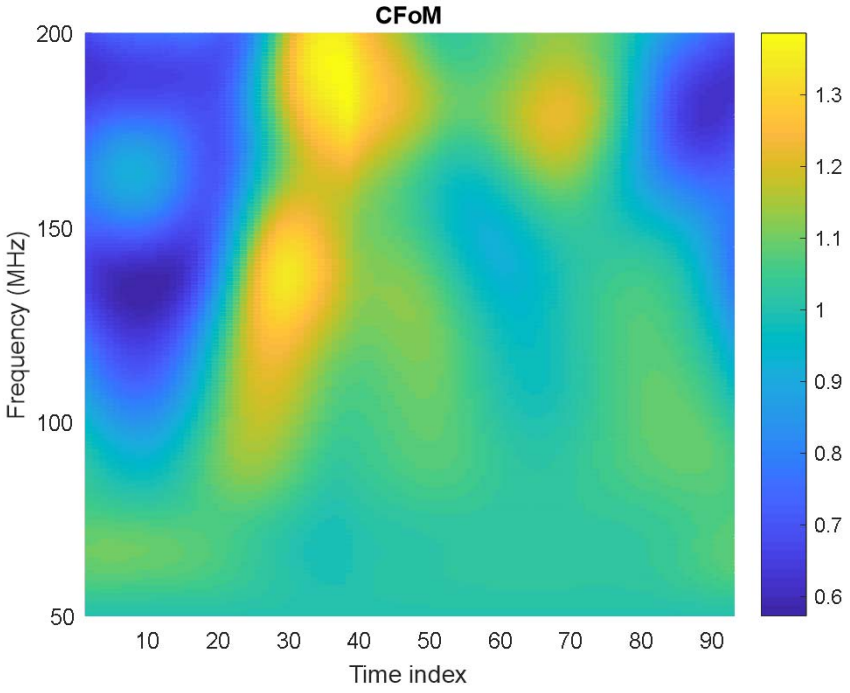
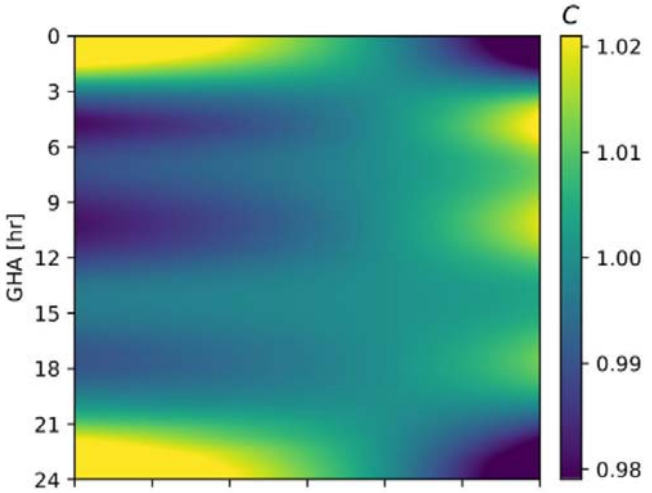
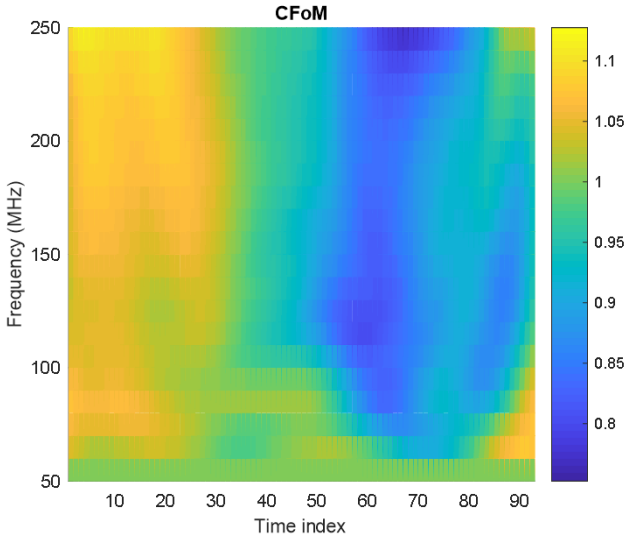


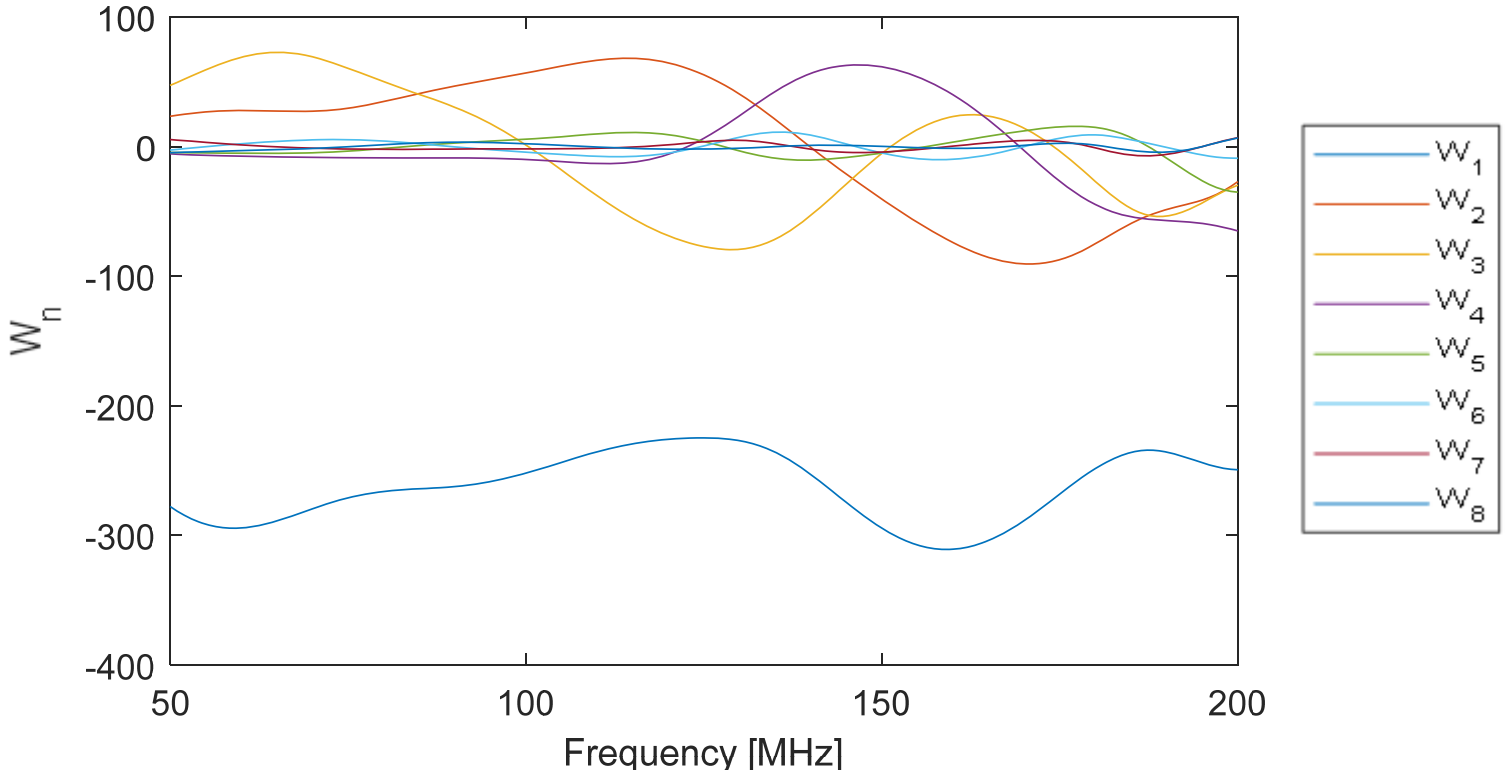
EDGES



Bowtie Dipole (Christos/Eloy)

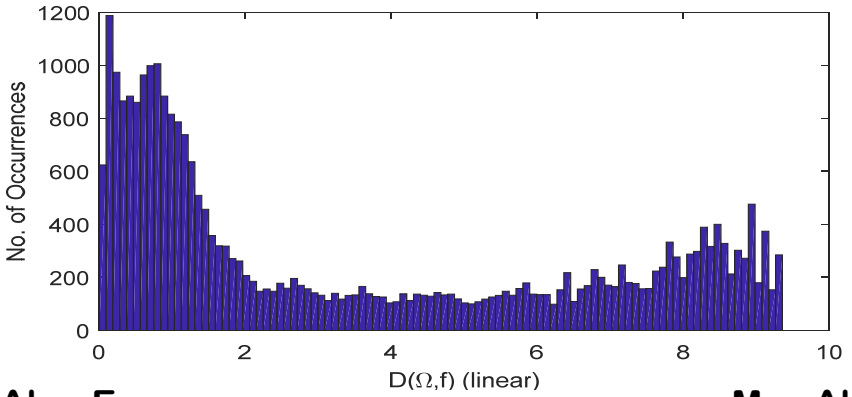


Elliptical Dipole – CBFP Coefficients

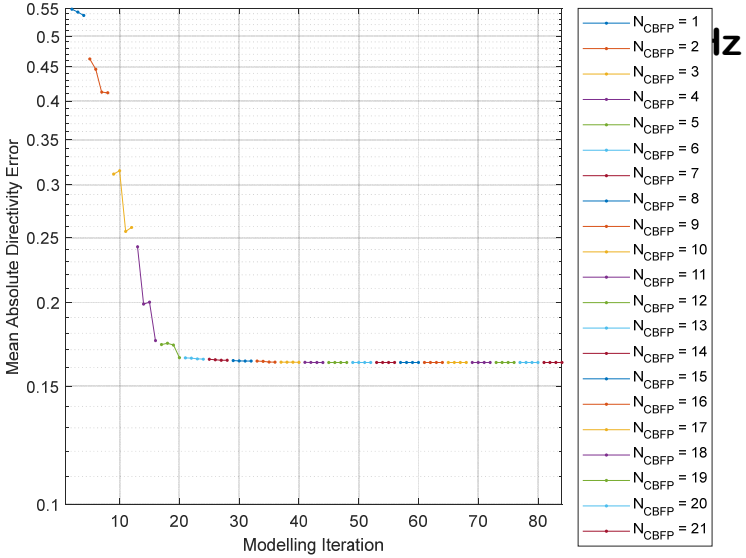


Elliptical Dipole – CBFP Directivity Model

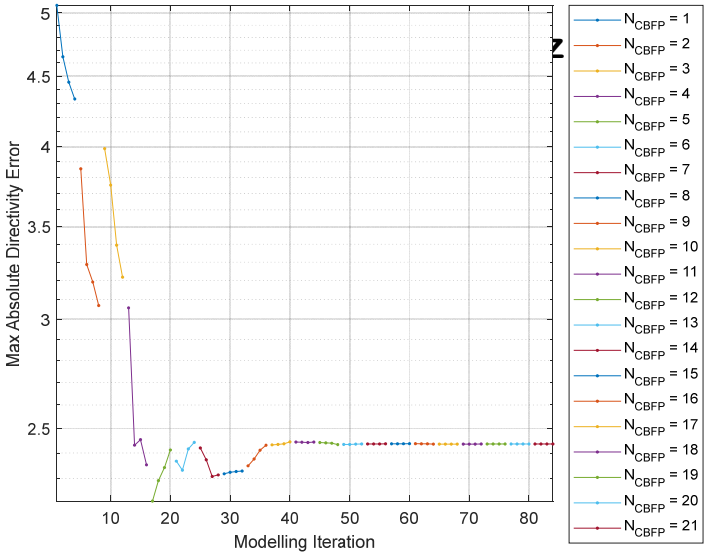
Simulated Pattern Directivity Magnitude Histogram



Mean Abs. Error (Angle, frequency)



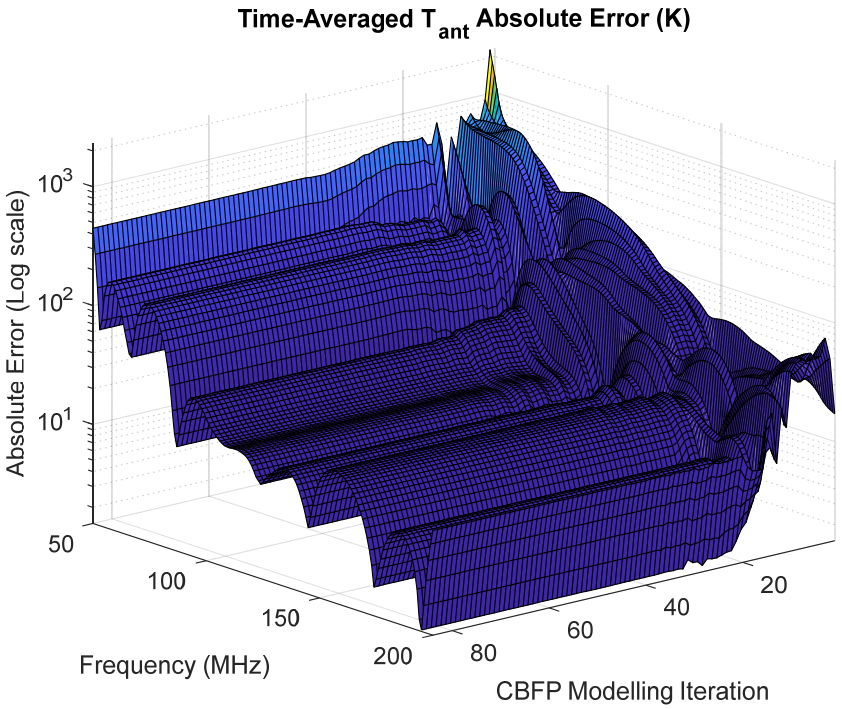
Max Abs. Error (Angle, frequency)



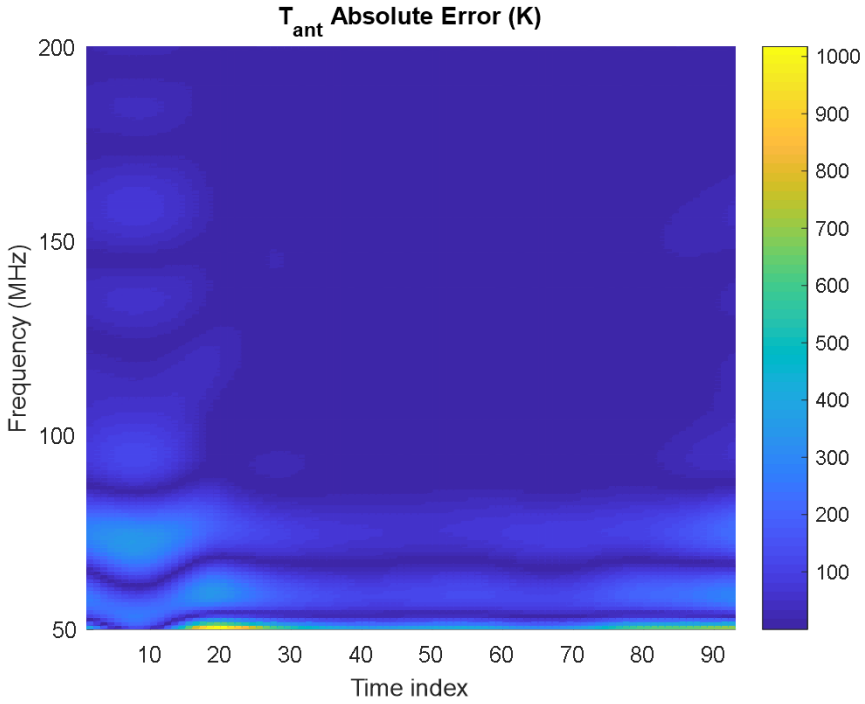
Elliptical Dipole – Antenna Noise Temperature

Time: 20/3/2019 (March Equinox) 02:46 (~0h LST) – 21/3/2019 02:46 (~24h LST)

Iterative Error Scores



Final Error (91 free parameters)



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Corrugated Horn – Chromaticity

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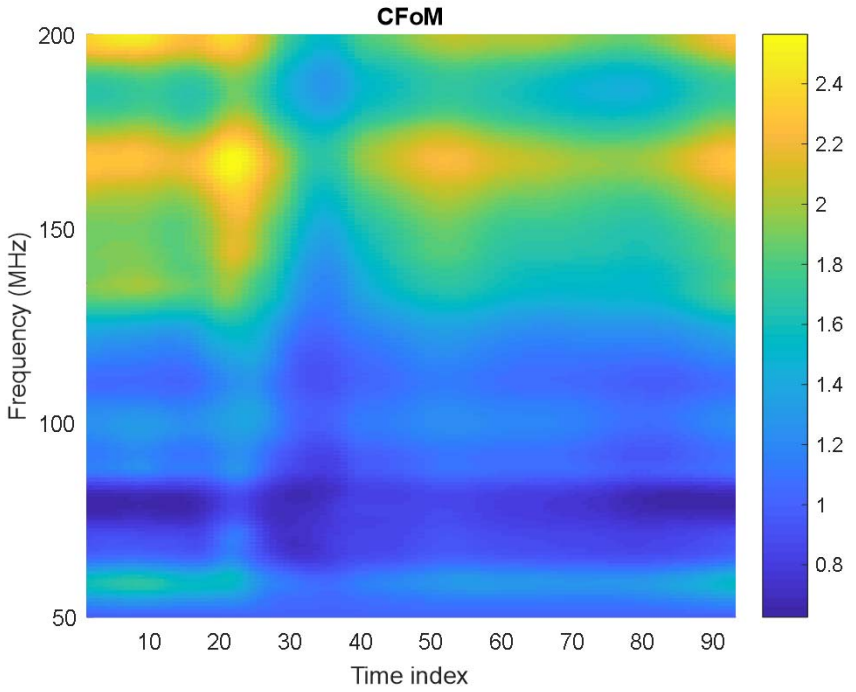
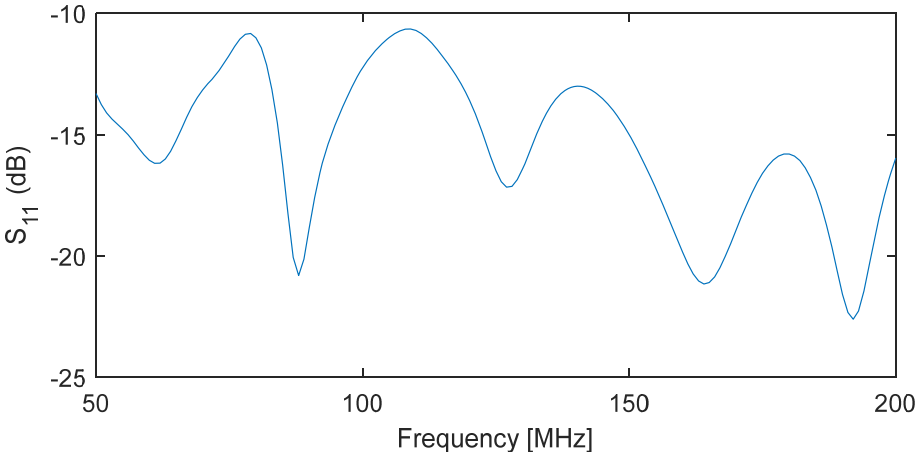
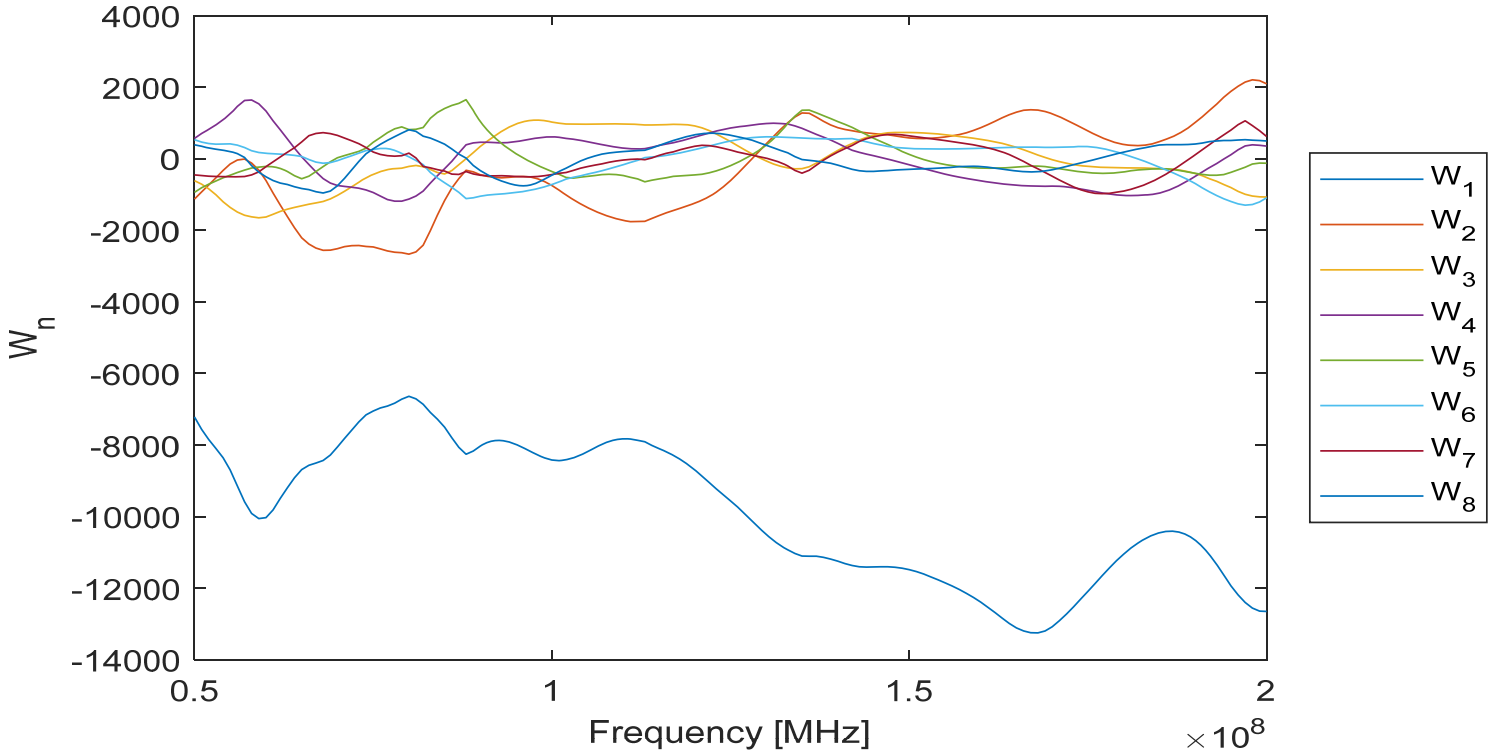
Far-Fields



Reflection Coefficient

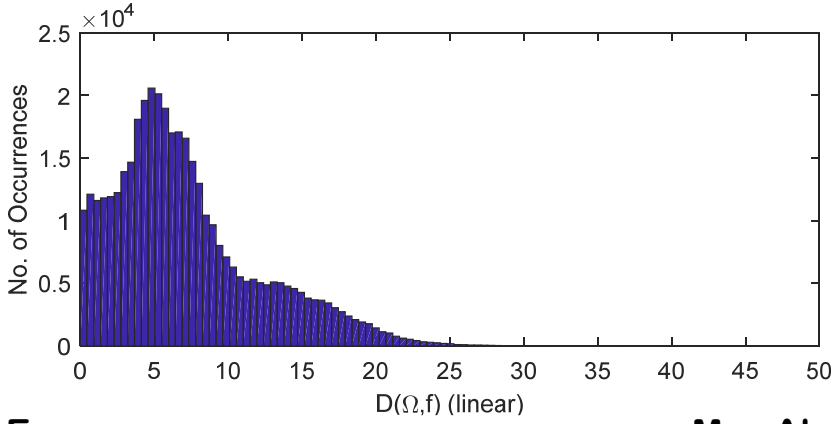


Corrugated Horn – CBFP Coefficients

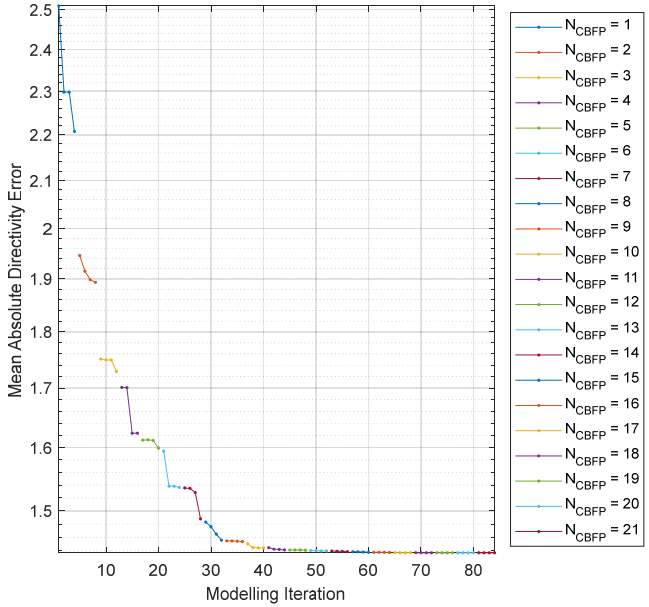


Corrugated Horn – CBFP Directivity Model

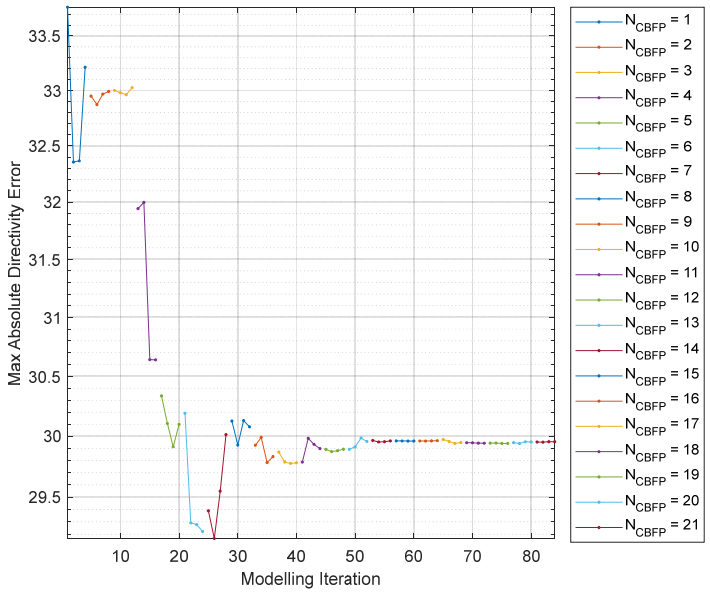
Simulated Pattern Directivity Magnitude Histogram



Mean Abs. Error (Angle, frequency)



Max Abs. Error (Angle, frequency)



Corrugated Horn – Antenna Noise Temperature

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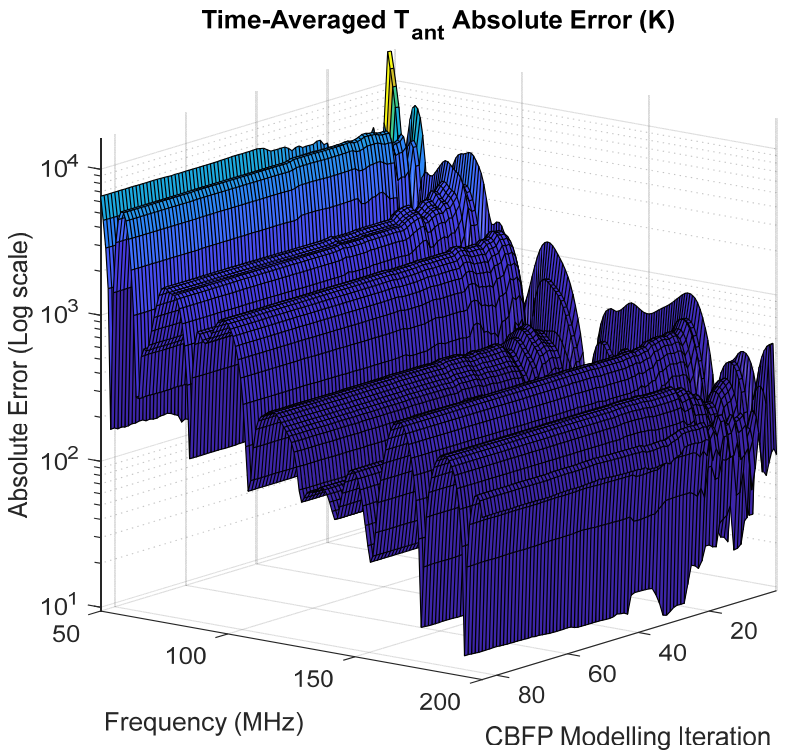
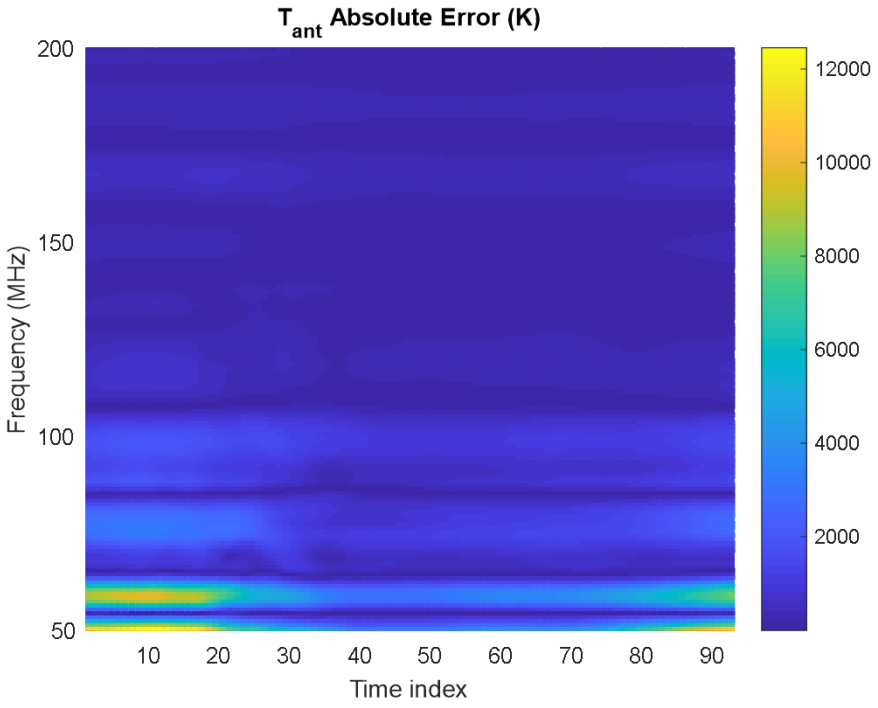
Iterative Error Scores



Final Error (91 free parameters)



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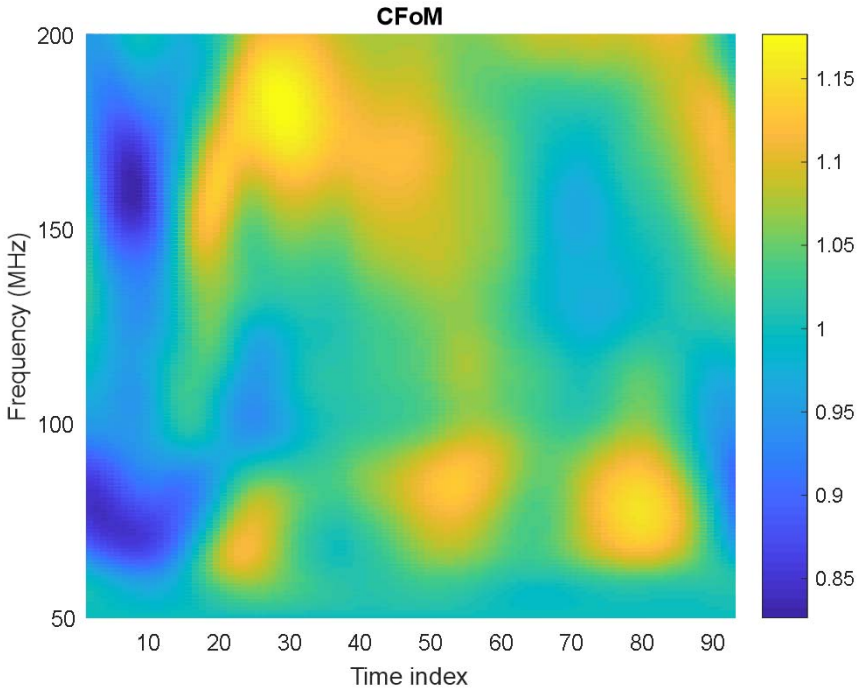
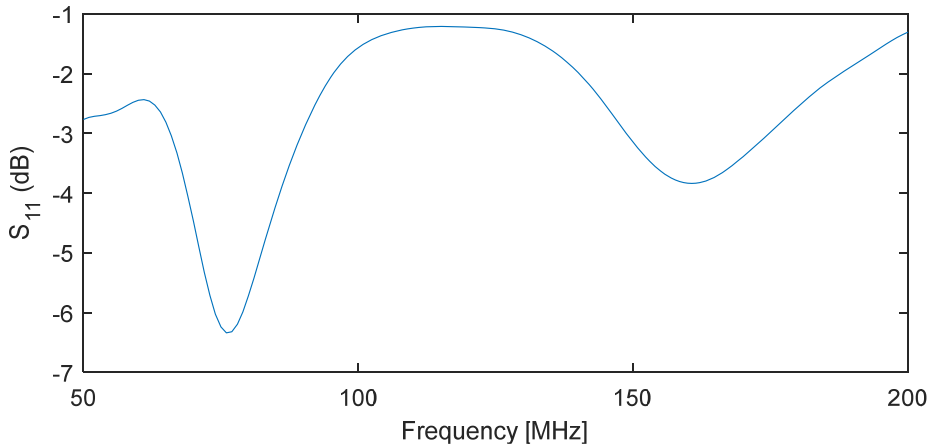
Far-Fields

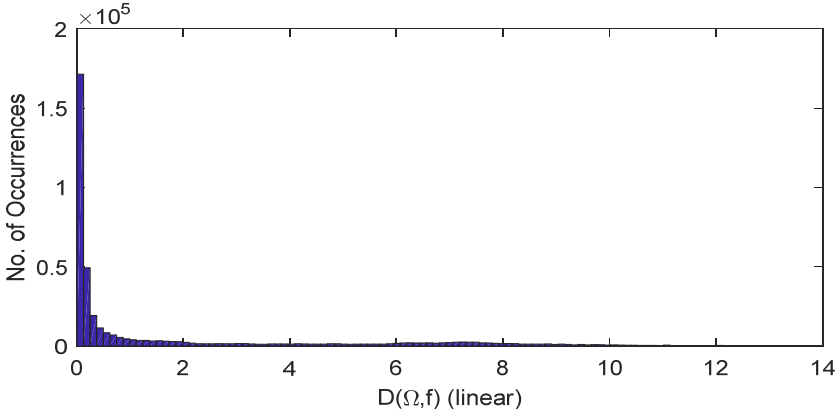


Reflection Coefficient



Conical Sinuous – CBFP Directivity Model

Simulated Pattern Directivity Magnitude Histogram



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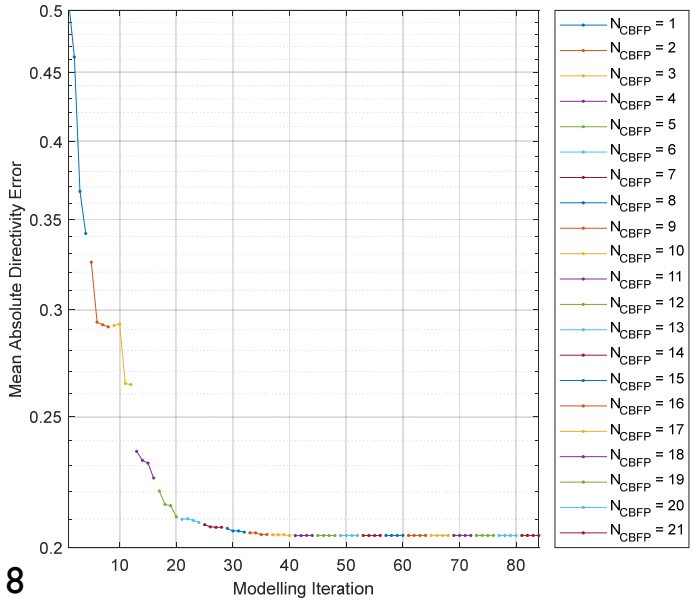

Max Abs. Error (Angle, frequency)