Documentation for the microTDFL

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Abstract

Abstract goes here.

1 Introduction

- Introductory remarks

2 Background

- Ohm's law
- Charge conservation
- EFIE
- Thin wire approximation
- Basically the same as section 2 in [1]

3 Framework

- Channel geometry (with pictures!)
- Overview of model operation and organization of history vector

4 Generating the Matrix

- Computation of geometric factors
- Interpolation of charges and currents
- Putting everything together to get the transition matrix

5 Two-Stage Stepping

- Motivation for two-stage averaging scheme
- Details of implementation

6 Stability Analysis

- Overview of eigenvalue-based stability analysis
- Pretty plots of eigenvalues! (and comments thereupon)
- Effect of parameters on stability

7 Equilibrium Charge Distribution

- Plots of equilibrium charge distribution with and without external field
- Comparison to results in Jackson paper

8 Off-Channel Field

- Details of off-channel field calculation
- Effect of distance and orientation on measured field

9 Stepped Leaders

- Implementation of adding segments
- Plots of off-channel field, comparison to HAMMA data

10 Frequency Response of Channel to External Field

- Power spectral density of radiated field

Appendices

- Briefly describe functions in microTDFL.py and their inputs/outputs

References

[1] Carlson, Brant. "Mathematical development of the TDFL." Will properly cite later.

[2] Jackson, John David. Paper on charge density on straight wire.

[3] Cite Jackson's E&M book?