

The following text is a **partial excerpt** on technical team communications ( 1st meeting )

From: [Nathan Wallace <n.wallace.us@ieee.org>](mailto:n.wallace.us@ieee.org) Aug 30, 2016 - 11:24 PM  
To: [H Newton](#) & [Lawrence D](#) \_CC [Jim LeBlanc](#) - **Attachments** --Paper Cui Meng  
IEEE on E1,E2,E3.pdf , Chapman \_ D777841.pdf, ADA009208.pdf, draft2.py

**Message body**

As I mentioned on the call, I **am far from an expert on this topic** and mainly just find the physics and the ability to simulate these events fascinating. At this stage, I do not feel comfortable sharing, presenting, or justifying *arguments* based on these calculations and simulation capabilities. Primarily for the *following reasons*:

- Though I have a BS in Physics, all of my **focus** over the past few years has been on **power grid and control system cybersecurity**.
- Chapman makes several assumptions (>10) to build his model, some of which **may be considered incorrect or outdated** by today's understanding.
- I personally need to **spend more time researching the priors, derivations, and assumptions**.

Attached is the current version of the **Python code** I wrote from examining Chapman's Fortran Code (1974). I've added a few terminal input options that let the user enter their own parameters or use the default values. The current draft **needs some work and is not converging on certain solutions as expected**. Future versions of the code will have a graphical interface and will plot the results. The primary purpose of this simulation capability is to determine how many **Volts/meter** will be produced for a given event at a given altitude. By knowing the Volts/meter, the induced current on a transmission line can be calculated and therefore the induced currents.

Also, I found another Thesis from AFIT that builds on Chapman's work, see **#AD-A009208 (1975 by Louis Seller )** attached. Lawrence, for your reference I attached Meng's paper, please excuse my notes...

**Thanks, Nathan** c: 318.730.9302

In a recent April 2017 email communication to current members of the technical team ...I wrote in part ....

The task is to review current progress details with Mark and Nathan; to offer suggestions; to gain an understanding of what has happened technically; and also review Nathan's uncompleted ( not optimized as desired ) Python coding and Mark's uncompleted coding; and to offer our insight for obtaining progress..... I note that there appears to be possible errors in equation number 61 as motioned by Nathan I believe. This involves comparing the Thesis equations of Terry Chapman to the Louis Seilers. Thesis equations Bring your computers. ....

This would be our first collaborative technical meeting designed to help each other via discussions and other collaborative techniques The first meeting ( Henry, Nathan and Lawrence) was to establish some ground rules in writing.