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Date: 9/25/14

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Date: 9/25/14

Fall 2014 Research Plan

1.) Write a brief outline of your research plan:
   This project is going to investigate stability issues with the Latency Insertion Method. The LIM algorithm has a limitation of the time step size for the numerical stability condition. I will explore the potential modifications of the original LIM algorithm to make it unconditionally stable. I will first study the research papers that has been published that deal with the stability issues of the Latency Insertion Method. Ideas from existing research will be useful for formulating new conditions to ensure stability. I will also study the Courant-Friedrichs-Lewy condition which is the theory behind the stability condition. In addition, I was advised by my mentor to study the paper on Alternating Direction Explicit-Latency Insertion Method (ADE-LIM) which gives a detailed explanation on how the stability problem of the conventional LIM method could be eliminated by modifying the formulation. Before fully understand the theory behind ADE-LIM, it would be helpful for me to read the paper on stability analysis of Semi-Implicit LIM Algorithm. Finite-difference time-domain method (FTDT), which is introduced in both papers will therefore be the focus of the primary stage of my research. I will study chapter 8 of the book "Theory and Computation of Electromagnetic Field" in order to fully understand FTDT.

2.) What do you hope to learn and achieve by the end of the semester?
   By researching on the stability issues, I believe I will find the optimized condition where both the computation time can be minimized and the approximation can be accurate. I will also have a deeper understanding of Latency Insertion Method make apply that to future circuit analysis.

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