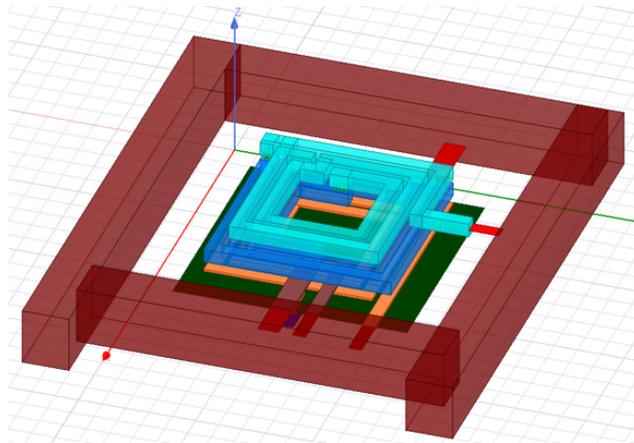




Master Thesis Topic

Electromagnetic Simulation and Optimization of T-Coils for High-Speed Interconnects



High-speed wireline systems require broadband, low-distortion signal coupling. T-coils are widely used as inductive peaking networks to extend bandwidth and improve rise times, but their performance depends on parasitics and layout coupling, making accurate EM simulations essential.

In this project, the layout and EM characterization of T-coil structures intended for multi-GHz interconnects is investigated. Starting from fundamental theory, the student will analyze how T-coils improve bandwidth and compensate for limited driver strength or capacitive loading. The main focus is on modeling these structures using 2.5D and 3D EM simulation tools to understand the impact of metal geometry, coupling, substrate effects, and high-frequency parasitics.

The objective of the *master thesis* is to develop a solid understanding of T-coil operation and their application in high-speed signaling. Various T-coil layout topologies suitable for integration in a *leading edge CMOS technology* are created, followed by performing EM simulations on Ansoft HFSS (or alternatives like openEMS, CST Studio Suite, EMPIRE XPU) to extract high-frequency models (S-parameters, RLC parasitics, coupling coefficients). Geometry and layout constraints are optimized to maximize bandwidth extension while minimizing loss and mismatch.

This research will be conducted through a collaboration between our ATE Lab and the IBM Research Zürich Lab in Rüschlikon. The student will be based in the ATE Lab, co-supervised by Dr. Marcel Kossel (Senior Research Scientist at IBM), and will have the opportunity to visit the renowned IBM Research Zürich facilities.

Requirements:	Enthusiastic in computational electromagnetics and high-end RF design
Character of the work:	20 % inquiry and theory / 80 % simulation
We offer:	Very state-of-the-art master thesis in an interesting research environment
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