Introduction

The miniaturization of microwave filters is an active area of research because most communication systems operate below 3 GHz where the resonator sizes are large. Among all microwave technologies microstrip is the cheapest one and is also compatible with integrated circuit fabrication techniques. Because of this, the miniaturization of microstrip filters has received much attention during the last two decades. Despite the numerous publications in this topic it remains an active area of research due mainly to the lack of theoretical bounds on the minimum achievable size for a given specification.

The objective of this new line of investigation within the Laboratorio de Electromagnetismo Aplicado (LABEMA) is to explore and extend the state-of-the-art in this important matter. With these goals in mind we set out to obtain:

- A comprehensive understanding of the state-of-the-art on miniature microstrip filters.
- New topologies, methods, and miniaturization techniques.
- A better understanding of the fundamental limits on microwave filter miniaturization.

Thesis Topics

We are looking for motivated students who want to do top-notch research in the area of applied electromagnetics and microwave circuits. The thesis topics can be roughly divided by the miniaturization technique used. Some of them are:

- Fractal resonators and general meander lines.
- Reactive loading of resonators.
- Dual-mode, triple-mode, quad-mode and general multi-mode resonators.
- General slow wave structures.
- Meta-materials.

There may be different thesis topics within each category.
Requirements

- A good understanding of circuit theory.
- Electromagnetic theory.
- Transmission line theory (SOG).
- English (If you can read this you’re probably fine. Writing is a plus).

NOTE: Other necessary technical content (like S-parameters theory, filter theory, and a basic knowledge of numerical methods) can be gained throughout the development of the thesis.

Administrative notes

- Your thesis adviser will be either Professor A. Zozaya or Professor P. Del Pino.
- I (Luis) will be your co-adviser and we’ll meet using Skype every other week to discuss the progress of your thesis.
- I’d like to plan for you to finish your thesis in about 6-12 months. This, of course, depends on your motivation.
- This guidelines are intended for undergraduate students. Graduate students are encouraged to contact Dr. Zozaya.

*Luis Ledezma is a graduate student at the University of South Florida. He is a member of the Wireless and Microwave Information Systems (WAMI) Group and the RF Microsystems group at USF. He is also a member of the Laboratorio de Electromagnetismo Aplicado (LABEMA) at the Universidad de Carabobo.*