

# **UCLA Electrical Engineering ARR 2011**

## **Session 2. Emerging Electromagnetics Techniques West Coast Room**

### **9:00-9:25**

"Dual Band Isolation Circuits Based on CRLH Transmission Lines for Triplexer Applications"

*Hanseung Lee and Tatsuo Itoh*

#### Abstract:

This presentation shows a novel dual band isolation network using a Composite Right/Left Handed (CRLH) transmission line (TL) and its application to a triplexer. This triplexer consists of three dual band isolation networks composed of a CRLH transmission line, and each network is connected to a bandpass filter. This triplexer has two significant advantages. First, there is no restriction in choosing filters. Any filters can be used in this concept and it is not necessary to modify characteristics of the filters. Second, the design process of the triplexer is straightforward and no complex numerical analysis process is needed.

### **9:25-9:50**

"Smoothed Sigmoid Circularly Polarized Waveguide Septum Design using Particle Swarm Optimization"

*Ilkyu Kim, Joshua Kovitz, and Yahya Rahmat-Samii*

(Abstract not available)

### **9:50-10:15**

"Near-field based Electrical and Communication Systems"

*Umar Azad, Crystal Jing and Yuanxun Ethan Wang*

#### Abstract:

To evaluate the performance of near-field energy transfer links, a near-field power transfer equation for an inductively coupled near-field system, analogous to Friis transmission equation for far-field communication, is derived. Experimental results show the proposed near-field coupling equation is trustworthy as it correctly predicts the transferred power versus distance relationship for different values of loaded quality factors at the

transmitter and the receiver. Capacity performance of near-field communication (NFC) links is analyzed for noise limited and interference limited scenarios. The analytical results provide guidelines for design of inductively coupled antenna systems as the power and capacity budget of the link is carried out.

**10:15-10:40**

"Stacked Tunable Filter Bank with Very Wide Tuning Range"

*Jim S. Sun, Noriaki Kaneda, and Tatsuo Itoh*

**Abstract:**

Tunable filters with wide tuning range are desirable in several wireless applications. We propose a partially shielded tunable filter structure using varactor-loaded split-ring resonator. The physical topology of the filter is suitable for vertical stacking of filters and enables a compact multi-layer tunable filter for applications requiring very wide tuning range. A prototype is developed with 5:1 frequency tuning capability, and design method is also presented for further improvement of the prototype or re-design at another frequency range.