

# Professor Alexander Tovbis

University of Central Florida

Thursday, October 4<sup>th</sup>  
Room 250, 60 West Charlton  
4:00 – 5:00 pm

## *Inversion Formula and Range Conditions for a Vector Multi-Interval Finite Hilbert Transformation in $L^2$*

Given  $n$  disjoint intervals  $I_j$  on  $\mathbb{R}$  together with  $n$  functions  $\psi_j \in L^2(I_j)$ ,  $j = 1, \dots, n$ , and an  $n \times n$  matrix  $\Theta$ , the problem is to find  $n$  functions  $\varphi_j \in L^2(I_j)$  satisfying the system

$$\sum_{k=1}^n \Theta_{jk} \mathcal{H}_k \varphi_k(z) = \psi_j(z), \quad z \in I_j, \quad j = 1, \dots, n,$$

where  $I = \cup_{j=1}^n I_j$  and  $\mathcal{H}_k : L^2(I_j) \rightarrow L^2(I)$  is a finite Hilbert transform.

Since we can interpret the right hand side as a generalized vector multi-interval finite Hilbert transform, we call the formula for the solution as “the inversion formula” and the necessary and sufficient conditions for the existence of a solution as the “range conditions”. In this talk we derive the explicit inversion formula and the range conditions for the case of positive definite symmetric matrix  $\Theta$  in terms of the solution of the associated matrix Riemann-Hilbert Problem. We also discuss other cases of the matrix  $\Theta$ .

This is a joint work with Marco Bertola and Alexander Katsevich.

Refreshments will be served 3:15 – 3:45 pm in the Faculty & Graduate  
Student Lounge Room 4118 French Hall West