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### MS3: Inverse Problems and Imaging I

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#### A Fast Accelerated Bundle Level Method for Large Scale Convex Optimization

Yunmei Chen, *University of Florida*

We present a fast accelerated prox-level (FAPL) method for large scale ball constrained and unconstrained convex optimization. It achieves optimal iteration complexity in theory, and reduces computation time and increases accuracy significantly in practice. This is accomplished by reducing the number of sub-problems involved in most existing bundle level type methods, and the novel algorithm to solve the sub-problem exactly. Our numerical results on solving large-scale least square problems and total variation based image reconstruction have shown great advantages of the FAPL methods over several state-of-the-art first-order methods.

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Zuhair Nashed, *University of Central Florida*

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#### Inverse Elastic Surface Scattering with Near-Field Data

Peijun Li, *Purdue University*

In this talk, we present a novel computational method for solving the inverse elastic surface scattering problem by using the near-field data. The method requires only a single illumination with one frequency and one incident angle. Numerical experiments will be shown that it is capable of reconstructing the scattering surfaces with subwavelength resolution.

#### Active Manipulation of Fields

Daniel Onofrei, *University of Houston*

In this talk we will present our new results regarding the near field active manipulation for acoustic and electromagnetic fields. In the first part of the talk we will discuss our results in the setting of the scalar Helmholtz equation. In this context, through a detailed sensitivity study, a qualitative comparison between existent far field schemes and the proposed near field scheme will be offered which will prove the feasibility of the latter approach. Then, in the second part of the talk we will present our theoretical approach for the active manipulation of electromagnetic fields in homogeneous isotropic linear media. Numerical results will be shown in the context of tuning normal modes in a cylindrical open waveguide.