

Name of the instructor: Puyan Mojabi

Title of the lecture: Introduction to Electromagnetic Inverse Problems

Level: Introductory

Abstract. Electromagnetic (EM) inversion is a systematic process for inferring internal properties of an investigation domain from its external EM effects. This involves formulating an EM inverse problem and solving it using appropriate algorithms and techniques. When the external EM effects consist of measured data, EM inversion finds applications in imaging, remote sensing, and non-destructive evaluation. On the other hand, if the external EM effects represent desired responses to be achieved, EM inversion is employed to tackle design problems. Solving EM inverse problems can involve (i) optimization techniques to predict solutions, (ii) computational EM solvers to evaluate the fitness of these solutions, (iii) regularization techniques to ensure numerical stability, (iv) methods to incorporate prior information, and (v) techniques to reduce the discrepancies between physical systems and numerical models. This lecture discusses some fundamental aspects of EM inverse problems through exploring two application areas: (1) EM inversion for microwave imaging and (2) EM inversion for metasurface design.

Please identify the level of the lecture in the description (introductory [for beginning grad students], intermediate, or advanced) and include a list of any prerequisite knowledge.

Biography. Puyan Mojabi is a Professor and a Tier 2 Canada Research Chair with the Department of Electrical and Computer Engineering, University of Manitoba, Winnipeg, Manitoba, Canada. He was a recipient of the University of Manitoba's Falconer Emerging Researcher Rh Award for Outstanding Contributions to Scholarship and Research in the applied sciences category, two Excellence in Teaching awards from the University of Manitoba's Faculty of Engineering, and the University of Manitoba's Graduate Students Association Teaching Award. He also received three Young Scientist awards from the International Union of Radio Science.