Fan Yin

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EDUCATION

University of Science & Technology of China **Hefei, China**

School of Information Science and Technology

Doctor of Electronics Science and Technology **09/2016-06/2022**

Relevant Courses: Real variable Function and Function Analysis, Optimization Theory, Matrix Analysis and Its Applications, Digital Signal Processing (II), Advanced Electromagnetic Field Theory, Computational Electromagnetics, Microwave Network Theory and Its Applications, Advanced Antenna Technology, Microwave Systems and Engineering.

Anhui University **Hefei, China**

School of Electronic and Information Engineering

Bachelor of Electronic Information Engineering **09/2012-06/2016**

Relevant Courses: Advanced Mathematics A, Linear Algebra, Probability Theory and Mathematical Statistics, Mathematic and Physical Method, College Physics, Electromagnetic Field and Waves, Signal and Linear System, Digital Signal Processing, Digital Image Processing, Linear & nonlinear Electronic Circuit, Digital Circuits & Logic Design, Microwave Technology, Electronic Measurements, Microcomputer & Embedded System.

RESEARCH INTERESTS

Nonlinear Inverse Scattering
Inverse Problem
Super-resolution
Through Wall Imaging

PUBLICATIONS

Fan Yin, Chang Chen, Weidong Chen, et al. "Superresolution quantitative imaging based on superoscillatory field," **Optics Express**, vol. 28, no. 5, pp. 7707-7720, 2020.

Fan Yin, Chang Chen and Weidong Chen, "Resolution enhancement for mixed boundary conditions in inverse scattering problems," **IEEE Transactions on Antennas and Propagation**, vol. 70, no. 5, pp. 3643-3655, 2021.

Fan Yin, Chang Chen and Weidong Chen, "A value piking method for mixed boundary conditions in inverse scattering problems," **Progress in Electromagnetics Research Symposium**, 2022.

RESEARCH EXPERIENCE

Sep. 2019 – Sep. 2020

Study of super-resolution in nonlinear inverse scattering methods based on super-oscillation

This research is developed in three stages:

Stage 1: Studying the super-resolution effect of vortex waves, which was attributed to superoscillation effects in monochromatic waves. The results were summarized in the final research project report of the National Nature Science Foundation of China.

Stage 2: Proposing an incident field optimization method to improve the imaging resolution without changing the

imaging structure. The reconstructed result with proposed incident field is better than the results with vortex waves. The results were published on *Optics Express* with title "Superresolution quantitative imaging based on superoscillatory field".

Stage 3: Proposing an explanation of the super-resolution effect in nonlinear inverse scattering methods and corresponding resolution limit based on the theory of superoscillation. The results were summarized in the dissertation for doctor's degree with title "Research on Superresolution Methods of Electromagnetic Inverse Scattering Reconstruction".

Sep. 2020 – Sep. 2021

Quantitative reconstruction for mixed boundary scatterers

This research is developed in three stages:

Stage 1: Studying the spatial-spectrum of total fields in the two-cylinder scattering case and generalize it to multi-cylinder cases, which happened to be the T-matrix formulation of multiple scattering.

Stage 2: Proposing a scattering model combined of the T-matrix formulation and the volume equivalence formulation, where the scattering coefficients are linear to the contrast sources.

Stage 3: Proposing an inversion method for the combined scattering model, where the contrast of dielectrics and the T-matrix of conductors are updated alternately. The method avoids the contrast interfered by the large imaginary parts of the conductors and improves the accuracy of the reconstructed T-matrix.

These results were summarized and published on *IEEE Transactions on Antennas & Propagation* with title "Resolution enhancement for mixed boundary conditions in inverse scattering problems".

Sep.2021 – Jun.2022

Nonlinear inverse scattering based on material sparsity

This research is developed in two stages:

Stage 1: Introducing a value piking regularization into the combined scattering model to constrain the solution space, where the T-matrix value of conductors is piecewise homogeneous. The results were published on *Progress in Electromagnetics Research Symposium* with title "A value piking method for mixed boundary conditions in inverse scattering problems".

Stage 2: Proposing a nonlinear Bayesian method for the inverse scattering of dielectric objects, where the prior model takes into account the piecewise homogeneity of the contrast. The results were summarized in the dissertation for doctor's degree with title "Research on Superresolution Methods of Electromagnetic Inverse Scattering Reconstruction".

HONOR & SCHOLARSHIP

Dec 2013	Outstanding Student scholarship in Anhui University
Dec 2014	Outstanding Student scholarship in Anhui University
Dec 2014	First Prize of TI Cup Anhui Undergraduate Electronic Design Competition
Sep 2018	The First Academic scholarship in University of Science & Technology of China
Sep 2019	The Second Academic scholarship in University of Science & Technology of China
Sep 2020	The Second Academic scholarship in University of Science & Technology of China
Sep 2021	The First Academic scholarship in University of Science & Technology of China
Dec 2021	The "Zeng Hua" scholarship in University of Science & Technology of China

SKILLS

- Programming Language: MATLAB, C/C++, Python, Verilog.
- Hardware Development: PCB Design, ARM/FPGA Development.
- Computational Electromagnetics: Method of Moments, Multipole Method.