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Editorial

Propagation Models and Inversion Approaches for Subsurface and Through-Wall Imaging

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1. Introduction

This special issue focused on propagation models and inversion approaches for subsurface and through-wall imaging. There were 16 contributions that can be divided into the following 3 clusters.

2. Contributions to Through-Wall Imaging

P. C. Chang et al. in their paper entitled "*Model-corrected microwave imaging through periodic wall structures*" introduced periodic layer Green's functions to overcome distortions seen in microwave imaging through periodic wall structures.

W. Zhang et al. in their paper entitled "*Ultrawideband impulse radar through-the-wall imaging with compressive sensing*" cast the problem of through-wall imaging in the framework of compressive sensing in order to significantly reduce the amount of data necessary to produce images.

M. Duman and A. C. Gurbuz in their paper entitled "*Performance analysis of compressive-sensing-based through-the-wall imaging with effect of unknown parameters*" investigated the required number of samples to achieve the desired resolution with compressive sensing methods.

S.-H. Tan et al. combined space-time signal processing and time-reversal electromagnetics to address subsurface and through-wall imaging in their paper entitled "*An automatic framework using space-time processing and TR-MUSIC for subsurface and through-wall multi-target imaging*."

Y. Yu et al. presented a low-cost UWB radar in their paper entitled "*A compact UWB indoor and through-wall radar with precise ranging and tracking.*"

M. M. Riaz and A. Ghafoor in their paper entitled "*Through-wall image enhancement based on singular value decomposition*" proposed a scheme to discriminate target, clutter, and noise subspaces based on the singular value decomposition of the data matrix.

3. Contributions to Subsurface Prospecting and RF Tomography

L. Di Donato et al. discussed the application of the linear sampling method as an inverse scattering approach to produce images of buried objects in the paper "*An effective method for borehole imaging of buried tunnels*."

L. Lo Monte et al. presented a new comprehensive forward propagation model applicable to subsurface imaging in their paper entitled "*A comprehensive forward model for imaging under irregular terrain using RF tomography*."

Y. Goykhman and M. Moghaddam developed a solution to the inverse problem for a three-layered medium, useful to represent a large class of natural subsurface structures, in their paper entitled "*Retrieval of parameters for three-layer media with nonsmooth interfaces for subsurface remote sensing.*"

F. Soldovieri et al. investigated the effectiveness of a tomographic approach in the interpretation of GPR data for archaeological prospecting in "*Imaging of scarce archeological remains using microwave tomographic depictions of ground penetrating radar data.*"

K. Takahashi et al. developed a technique to model and assess the effectiveness of ground penetrating radars in the presence of clutter in their paper entitled "*Modeling of GPR clutter caused by soil heterogeneity.*"

The identification of shape and size of simple underground objects, using training data and a decision tree method, was discussed by N. R. Syambas in the paper "*An approach for predicting the shape and size of a buried basic object on surface ground penetrating radar systems.*"

4. Contribution to Direct and Inverse Models for Remote Sensing

E. A. Marengo et al. explored the target position information that can be extracted from scattering data in the context of the scalar Helmholtz equation using a statistical framework in the paper "Cramér-Rao bound study of multiple scattering effects in target localization".

Two useful contributions in propagation models were given by Frezza et al. in "*Line source scattering by buried perfectly-conducting circular cylinders*" and Gennarelli and Riccio in "*Useful solutions for plane wave diffraction by dielectric slabs and wedges*."

Finally, F. Soldovieri et al. discussed two methods in order to monitor the presence of life signs in the paper "*A feasibility study for life signs monitoring via a continuous wave radar*."

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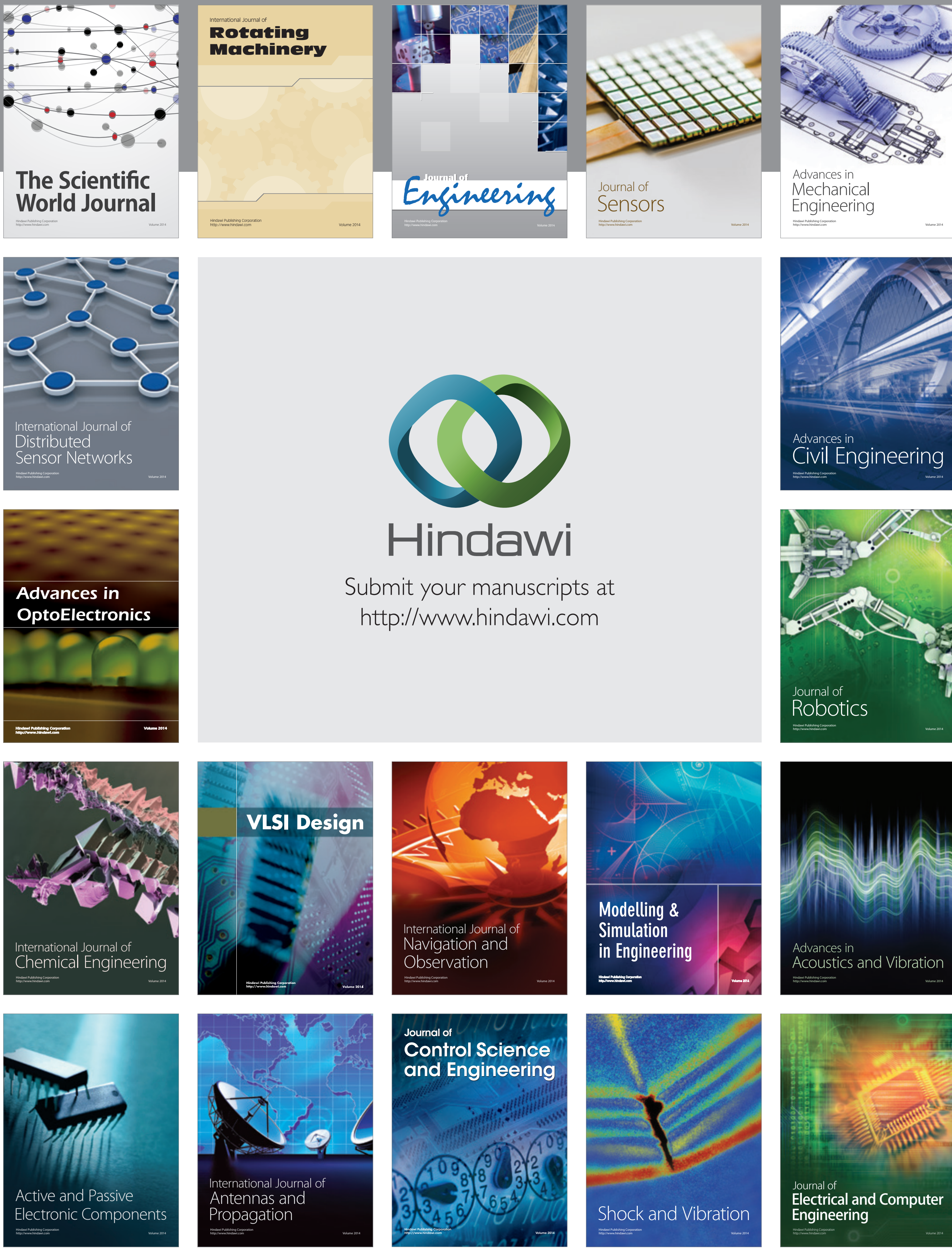
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