DAYS ON DIFFRACTION 2013

INTERNATIONAL CONFERENCE

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ABSTRACTS

The conference is sponsored by

FOREWORD

"Days on Diffraction" is an annual conference taking place in St. Petersburg since 1968. The event is organized in May–June by St. Petersburg State University, St. Petersburg Department of Steklov Mathematical Institute and Euler International Mathematical Institute of the Russian Academy of Sciences.

This booklet contains the abstracts of 196 talks to be presented at oral and poster sessions in 5 days of the Conference. Author index can be found on the last pages.

The full texts of selected talks will be published in the Proceedings of the Conference. The texts in LaTeX format are due by June 16, 2013 to e-mail `diffraction13@gmail.com`. Format file and instructions can be found on the Seminar Web site at `http://www.pdmi.ras.ru/~dd/proceedings.php`. The final judgement on accepting the paper for the Proceedings will be made by the Organizing Committee following the recommendations of the referees.

We are as always pleased to see in St. Petersburg active researchers in the field of Diffraction Theory from all over the world.

Organizing Committee

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Projection methods for computation of spectral characteristics of weakly guiding optical waveguides

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The original problem on eigenmodes of a weakly guiding step-index optical waveguide with smooth boundary of the cross section domain is considered.

We are looking for surface and leaky eigenmodes which satisfy to the real and complex propagation constants respectively.

The original problem is reduced by the simple layer potential method to a nonlinear spectral problem for the set of weakly singular boundary integral equations.

We approximate the integral operator by collocation method and Galerkin method.

The convergence and quality of these numerical methods are proved by numerical experiments. The collocation method demonstrates better speed of convergence.

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Heart and respiration rate estimation in the radar doppler health monitoring system using of Wigner–Ville distribution method

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The radar Doppler system for unobtrusive and non-contact monitoring of heart and respiration activity from distance is a powerful tool for security, emergency and Telemedicine applications. The back scattered signal to the receiver of this system is an amplitude-frequency (AM-FM) modulated signal which is modulated by the Doppler effect of the heart and respiration chest motion. In this paper, an efficient signal processing method for time-frequency representation (TFR) of the signal and extraction the information from high noisy signal is introduced. This method is based on Wigner-Ville distribution which is used to demodulate the phase of the received signal and extract the vital signs information. The simulation results show that the heart and respiration rates could be obtained with acceptable accuracy from the noisy signal in low SNR levels.