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## Abstrakt

Podstawowym celem pracy jest przedstawienie opracowanych uogólnionych metod analizy zagadnień elektrostatyki układów planarnych zarówno periodycznych jak i nieperiodycznych, zawierających skończoną ilość elementów, do celów efektywnego rozwiązywania zagadnień brzegowych w teorii generacji i detekcji fal akustycznych oraz analizy zagadnień brzegowych w teorii fal elektromagnetycznych dla przypadku struktur falowodowych.

**(nie więcej niż jedna strona)**

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## Abstract

The work aims to present extensions of the developed methods used in electrostatic analysis of planar periodic and finite systems for efficient solving of variety of the acoustic and electromagnetic wave generation and scattering problems. Specifically, their generalization for application in the acoustic beam-forming analysis is reported. Moreover, certain electromagnetic wave scattering problems by periodic waveguiding structures which can be efficiently approached by these methods are also considered.

**(nie więcej niż jedna strona)**

## Symbole i skróty (opcjonalnie)

Lista symboli i skrótów użytych w pracy:

$\omega, \Omega$	– angular frequency
$f$	– temporal frequency
$f_0$	– central frequency (of a transducer)
$\lambda$	– wave-length
$k$	– wave-number
$\Lambda$	– period of strips (group of strips) or baffles (group of baffles)
$K$	– spatial spectrum wave-number of periodic array of strips (baffles)
$P_k$	– Legendre polynomials of the first kind
$J_k$	– Bessel function of the first kind of order $k$
$\Gamma$	– gamma function
$\phi$	– electrostatic or acoustic potential
$Q$	– electrostatic charge
$V$	– potential difference (voltage between strips)
$\sigma$	– surface charge distribution
$x, y, z$	– Cartesian space variables
$\epsilon_0$	– dielectric permittivity of vacuum
$\epsilon$	– effective surface dielectric permittivity
$\mu_0$	– magnetic permeability of vacuum
$\mathbf{E}$	– electric field vector
$\mathbf{H}$	– magnetic field vector
$\mathbf{D}$	– electric induction vector
$E_i$	– components of electric field, $i = x, y, z$
$H_i$	– components of magnetic field, $i = x, y, z$

$D_i$	– components of electric induction, $i = x, y, z$
$G(\xi)$	– planar harmonic Green's function
$\Phi(\xi)$	– spectrum representation of the complex (electrostatic) field function
$\Phi(x)$	– spatial representation of the complex (electrostatic) field function
$d$	– strip half-width
$r, s$	– spectral variables related to the $x, y$ spatial coordinates constrained to one Brillouin zone
$\mathcal{F}$	– Fourier transform
$p$	– acoustic pressure
$\rho_a$	– mass density of the acoustic media
$v_z$	– $z$ -component (normal component) of the particle velocity
$\Pi$	– acoustic power
$\Pi_z$	– normal component of the acoustic Poynting vector
SAW	– surface acoustic wave
IDT	– interdigital transducer
BIS	– Blotekjær, Ingebrigtsen, and Skeie expansion method
FFT	– fast (finite) Fourier transform
SNR	– signal-to-noise ratio
SA	– synthetic aperture
SAFT	– synthetic aperture focusing technique
M-SAFT	– multi-element synthetic aperture focusing technique
STA	– synthetic transmit aperture
MSTA	– multi-element synthetic transmit aperture
TM	– transverse magnetic wave polarization
TE	– transverse electric wave polarization



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Lista rysunków (**opcjonalnie**)



# Wstęp

## 1.1 Tytuł sekcji 1.1

A manuscript submitted for publication to IPPT Reports on Fundamental Technological Research should be original work which have not been previously published and should not be under consideration for publication elsewhere. Submitted materials should be written in good English. Exceptionally, submissions of the PhD and Habilitation theses written in the language other than English are also possible, provided that they are accompanied by parallel submissions of their summaries written in good English.

The summaries should be prepared in the form of research or communication articles suitable for publication in regular journal issues. Manuscripts in an electronic format should be submitted by e-mail on the address `reports@ippt.gov.pl`, together with their pdf copies for peer-review processes. The Authors also have to deliver the entire manuscript (text and the figures) in pdf file format on CD-ROM to the Editorial Office of the IPPT Reports on Fundamental Technological Research, personally or send by mail at the address:

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To be able to use required font the Author's are encouraged to use the  $\LaTeX$  which enables using unicode fonts. This template is a guideline preparation of the manuscript for printed version. The paper format is B5 and the text font for main body of the manuscript is Times New Roman 11 pt. The printing area is 13.2 cm x 19.2 cm. The manuscript should be prepared in single-column format. Body paragraphs should be unindented and have 6pt spacing in between. The margins should be 1.75 cm on each side of the paper (top, bottom, left, and

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Tytuł podpodsekcji (bez numeru)

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# Tytuł Rozdziału 2

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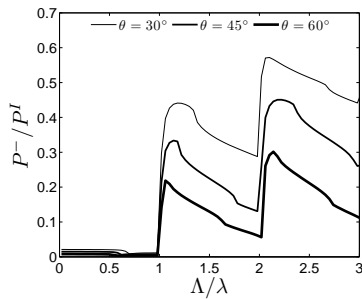
Math equations should be centered and equation numbers including chapter numbers should be placed in brackets and set flush right:

$$y = ax + b. \quad (2.1)$$

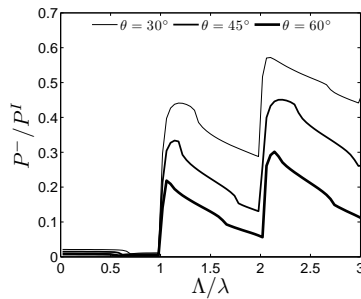
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(a)



(b)

Rysunek 2.1. Example of the figure caption (a) subfigure 1 and (b) subfigure 2.

## 2.3 Tytuł sekcji 2.3

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**A**

Tytuł załącznika A

Appendices should be numbered with capital letters.



## Tytuł załącznika B

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# Summary

(in English, no figures, two pages only in addition to the polish text!)





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