Таким чином, ринок нерухомості України потребує комплексного підходу до просторового забезпечення. Розвиток інфраструктури, узгоджене містобудування, регулювання ринку, підтримка перспективних регіонів та зелене будівництво є важливими напрямами для забезпечення сталого та успішного його функціонування. Відповідне управління та співпраця всіх зацікавлених сторін є ключем до досягнення цієї мети.

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Martin Sagradian, PhD candidate in Mathematics, Associate Professor of Department of Mathematics and Statistics, Macquarie University.

Balaclava Rd, North Ryde NSW, 2109, Sydney, Australia

martin.sagradian@mq.edu.au

THE SCATTERING ANALYZE OF ACOUSTIC AND RADAR WAVES AND ELECTROSTATIC PROBLEMS IN THREE-DIMENSIONAL STRUCTURES OF ROTATION

The purpose of our research was to present a complex mathematical structure and the scattering analyze of acoustic and radar waves and electrostatic problems in three-dimensional structures of rotation. These structures, formed by rotating curves of arbitrary shape and having coaxial holes at both ends, create a topologically double connected surface. The internal flexibility of the design allows consideration of a wide range of conductors and dissipators commonly encountered in practical applications.

In addition, we investigated objects complementary to double-bonded structures, an example of which is a parallel disk capacitor. The study of open structures using purely numerical methods leads to the formulation of the Fredholm integral equation of the first kind. However, this approach creates numerical problems and can produce solutions that do not have a physical correspondence, in particular due to the presence of edges, which makes improving the accuracy a difficult task.

To overcome these problems, the method of analytic regularization (MAR), a semi-analytical semi-numerical method, has been proposed. This method transforms the initial problem into an infinite system of linear algebraic equations of the second kind. Based on the theory of triple series equations involving Jacobi polynomials and the integral Abel transform, this approach has previously been used to solve problems of electrostatics and wave scattering for canonical structures and single-aperture cavities. The resulting system can be solved with a predetermined accuracy using a reduction technique. The development of object-oriented software, which takes into account various structures and parameters of the

problem, simplifies numerical studies.

The adaptability of the proposed approach encourages the study of practical problems. Capacitance and potential distribution calculations for commonly used conductors, including spheroidal barrels, finite open cylinders, truncated cones, and parallel disk capacitors, show excellent agreement with established literature results. The study extends to modifications of these structures, providing insight into how electrostatic characteristics evolve with shape changes.

In addition to electrostatics, our thoughts delve into the study of scattering of acoustic waves from soft objects. The MAR approach facilitates the determination of the full spectral portrait of the scatterer, enabling the calculation of the complex eigenvalues of the cavity. Scattering characteristics such as sonar and bistatic cross sections as well as field distributions are calculated and analyzed for a variety of objects.

The research we present serves many purposes. From a mathematical point of view, the formulation and rigorous solution of the problem relate to a complex problem in mathematical physics. Over time, these solutions become objects of further study in applied and computational mathematics, where theoretically efficient solutions are transformed into highly efficient computing programs.

Furthermore, the value of these methods lies in their potential to extend the capabilities of existing methods for the analysis of practical problems. If the developed computer codes turn out to be more effective, they will expand the possibilities in the design of new technical devices. Furthermore, if these codes are

more accurate, they serve as reference solutions, offering accurate investigations of new problems and validating results obtained by approximate engineering methods or purely numerical methods.

Specific studies illustrate the rigorous solutions required in electrostatics, especially for charged open hollow "tubular" conductors of variable cross-section. They can model the elements of electrostatic lenses or electrostatic filters, where highly accurate calculations of the electrostatic potential are crucial to the design of efficient devices.

Constant interest in the study of acoustic scattering by resonant objects arises from the need to improve the accuracy of target recognition. This interest is especially relevant for the recognition of underwater targets. Progress in this field is achieved due to the study of the spectral characteristics of various resonant objects, which allows predicting their resonant response in certain frequency ranges relevant to acoustic radiation. The study is focused on the spectral characteristics of open hollow axisymmetric cavities with soft walls in order to obtain a method of accurate calculation of complex eigenvalues in the diffraction frequency range for open cavities of arbitrary shape.