

BOOK REVIEW

The Direct Integration of Ordinary Differential Equations

A.B Urdaletova, PhD – Professor, Mathematics, Kyrgyz-Turkish MANAS University, Bishkek, Kyrgyz Republic

S.K. Kydyraliev, PhD – Professor, Mathematics, American University in Central Asia, Bishkek, Kyrgyz Republic

The book, *The Direct Integration of Ordinary Differential Equations* (Nova Science Publishers, 2025), by A. B. Urdaletova and S. K. Kydyraliev is a fundamental study in applied mathematics devoted to methods of solving ordinary differential equations (ODEs) through direct integration. The authors aim to fill the gap once noted by L. D. Landau, who emphasized the lack of textbooks focusing on practical solution techniques rather than on existence theorems.

Structurally, the book consists of four chapters. The first chapter deals with first-order ODEs, where, in addition to classical examples, the authors consider problems from economics, physics, and sociology (for example, modeling body temperature change or the spread of information in society). This interdisciplinary approach makes the material illustrative and closer to real-world applications.

The second chapter explores methods of direct integration for higher-order linear equations. The authors introduce the technique of chain decomposition, which significantly simplifies solving problems with constant and variable coefficients.

The third chapter focuses on systems of linear equations, including the generalization of the direct integration method to multidimensional cases. Of particular interest are the applications to problems in mechanics and physics. The fourth chapter discusses more advanced equations with variable coefficients, as well as Riccati equations. This section stands out in showing the applicability of direct integration even in cases where traditional approaches are usually applied.

A strong feature of the book is its practical orientation. Each chapter contains numerous examples and exercises demonstrating the efficiency of the proposed approach. The presented models — from economic problems to logistic curves and physical processes — make the book useful not only for mathematicians but also for specialists in related fields.

The clarity of exposition is also noteworthy: despite the complexity of the material, the authors avoid excessive formalism, emphasizing intuitive understanding of the methods. This makes the book accessible to senior students and graduate students studying differential equations in an applied context.

From a scientific perspective, the work is valuable as an attempt to systematize and extend the class of direct integration methods. It can serve as a foundation for further research in the field of analytical methods for solving differential equations.

In conclusion, *The Direct Integration of Ordinary Differential Equations* deserves high praise. It combines mathematical rigor, practical focus, and a wide range of applications. The book will

be useful both in academic teaching and for researchers seeking efficient methods for solving applied problems.

Professor Asan Baizakov, PhD

Head of the Laboratory of the Institute of Mathematics of the National Academy of Sciences of the Kyrgyz Republic