

**I.G. PETROWSKY
SELECTED WORKS**

**PART II
Differential Equations
and
Probability Theory**

Edited by

O.A. Oleinik

*Department of Mathematics and Mechanics
Moscow State University, Moscow, Russia*

Translated from the Russian by

G.A. Yosifan

GORDON AND BREACH PUBLISHERS

Australia • China • France • Germany • India • Japan • Luxembourg • Malaysia
The Netherlands • Russia • Singapore • Switzerland • Thailand • United Kingdom • United States

CONTENTS

<i>Foreword</i>	ix
Editor's Preface	xi
Ivan Georgievich Petrowsky	1
<i>P.S. Alexandrov and O.A. Oleinik</i>	

PETROWSKY'S ARTICLES ON PARTIAL DIFFERENTIAL EQUATIONS

1. Remarks on the Works of O. Perron and L.A. Lusternik on the Dirichlet Problem	12
2. Perron's Method for Solving the Dirichlet Problem	20
3. New Proof of the Existence of Solutions for the Dirichlet Problem by the Finite Difference Method	30
4. On the First Boundary Value Problem (the Dirichlet Problem) for Elliptic Equations and Some Properties of Functions Satisfying These Equations	43
5. On the First Boundary Value Problem for the Heat Equation	71
6. Studies of the Diffusion with the Increasing Quantity of the Substance; Its Application to a Biological Problem	106
7. On the Speed of Propagation of Discontinuities of Displacement Derivatives on the Surface of a Non-Homogeneous Elastic Body of Arbitrary Shape	133
8. Some Problems in the Theory of Partial Differential Equations	139
9. Contribution of S.N. Bernstein to the Theory of Partial Differential Equations	172

PETROWSKY'S ARTICLES ON ORDINARY DIFFERENTIAL EQUATIONS

10. On the Behavior of Integral Curves for a System of Ordinary Differential Equations in a Neighborhood of a Singular Point 194
11. On the Number of Limit Cycles for the Equation $\frac{dy}{dx} = \frac{P(x,y)}{Q(x,y)}$,
where P and Q are Polynomials of Degree 2 255

PETROWSKY'S ARTICLES ON THE THEORY OF PROBABILITY AND OTHER PROBLEMS OF ANALYSIS

12. On the Problem of Random Walk 278
13. On the Uniqueness of a Primitive Function Determined by its Generalized Derivative with Respect to an Arbitrary Continuous Function 299
14. On Reducing the Second Variation to Canonical Form by Triangular Transformations 312

APPENDIX: COMMENTARIES

- On the Dirichlet Problem for the Laplace Equation
(a commentary on articles 1–3) 326
E.M. Landis, O.A. Oleinik
- On the Theory of Elliptic Equations (a commentary on article 4) 329
E.M. Landis, O.A. Oleinik
- On the First Boundary Value Problem for Second Order Parabolic Equations (a commentary on article 5) 352
E.M. Landis, S.A. Molchanov
- Propagation of Waves Described by Nonlinear Parabolic Equations (a commentary on article 6) 364
A.I. Volpert
- On a Problem in the Theory of Elasticity
(a commentary on article 7) 400
A.F. Filippov
- On Petrowsky's Problems in the Theory of Partial Differential Equations (a commentary on article 8) 402
O.A. Oleinik

Singular Points of Vector Fields (a commentary on article 10) <i>Yu. S. Ilyashenko</i>	420
Limit Cycles on the Real and Complex Plane (a commentary on article 11) <i>Yu. S. Ilyashenko</i>	464
On Random Walks (a commentary on article 12) <i>S.A. Molchanov</i>	487
On a Problem of Lebesgue (a commentary on article 13) <i>E.M. Landis</i>	491
On a Problem in the Calculus of Variations (a commentary on article 14) <i>V.M. Tikhomirov</i>	492
List of Petrowsky's Scientific Publications	495
Index	500