
Contents

| | |
|--|------|
| Foreword | ix |
| Preface | xiii |
| Chapter 1. The Eccentricity of the Keplerian Orbit of Mars | 1 |
| Chapter 2. Rescuing the Empennage | 3 |
| Chapter 3. Return Along a Sinusoid | 5 |
| Chapter 4. The Dirichlet Integral and the Laplace Operator | 7 |
| Chapter 5. Snell's Law of Refraction | 11 |
| Chapter 6. Water Depth and Cartesian Science | 15 |
| Chapter 7. A Drop of Water Refracting Light | 17 |
| Chapter 8. Maximal Deviation Angle of a Beam | 19 |
| Chapter 9. The Rainbow | 21 |
| Chapter 10. Mirages | 25 |
| Chapter 11. Tide, Gibbs Phenomenon, and Tomography | 29 |

| | |
|---|-----|
| Chapter 12. Rotation of a Liquid | 33 |
| Chapter 13. What Force Drives a Bicycle Forward? | 37 |
| Chapter 14. Hooke and Keplerian Ellipses and Their Conformal Transformations | 39 |
| Chapter 15. The Stability of the Inverted Pendulum and Kapitsa's Sewing Machine | 45 |
| Chapter 16. Space Flight of a Photo Camera Cap | 49 |
| Chapter 17. The Angular Velocity of a Clock Hand and Feynman's "Self-Propagating Pseudoeducation" | 51 |
| Chapter 18. Planetary Rings | 55 |
| Chapter 19. Symmetry (and Curie's Principle) | 59 |
| Chapter 20. Courant's Erroneous Theorems | 61 |
| Chapter 21. Ill-Posed Problems of Mechanics | 65 |
| Chapter 22. Rational Fractions of Flows | 69 |
| Chapter 23. Journey to the Center of the Earth | 71 |
| Chapter 24. Mean Frequency of Explosions (according to Ya. B. Zel'dovich) and de Sitter's World | 75 |
| Chapter 25. The Bernoulli Fountains of the Nikologorsky Bridge | 79 |
| Chapter 26. Shape Formation in a Three-Liter Glass Jar | 83 |
| Chapter 27. Lidov's Moon Landing Problem | 87 |
| Chapter 28. The Advance and Retreat of Glaciers | 91 |
| Chapter 29. The Ergodic Theory of Geometric Progressions | 99 |
| Chapter 30. The Malthusian Partitioning of the World | 101 |

| | |
|--|-----|
| Chapter 31. Percolation and the Hydrodynamics of the Universe | 103 |
| Chapter 32. Buffon's Problem and Integral Geometry | 107 |
| Chapter 33. Average Projected Area | 111 |
| Chapter 34. The Mathematical Notion of Potential | 115 |
| Chapter 35. Inversion in Cylindrical Mirrors in the Subway | 127 |
| Chapter 36. Adiabatic Invariants | 143 |
| Chapter 37. Universality of Hack's Exponent for River Lengths | 153 |
| Chapter 38. Resonances in the Shukhov Tower, in the Sobolev Equation, and in the Tanks of Spin- Stabilized Rockets | 155 |
| Chapter 39. Rotation of Rigid Bodies and Hydrodynamics | 161 |