

CONTENTS

| | |
|---|-----|
| PREFACE TO THE FIRST EDITION | v |
| PREFACE TO THE SECOND EDITION | vii |
| INTRODUCTION | 1 |

CHAPTER 1

NATURAL OSCILLATIONS IN SYSTEMS CLOSE TO LINEAR ONES

| | |
|--|-----|
| § 1. DEVELOPMENT OF ASYMPTOTIC SOLUTIONS | 39 |
| § 2. CONSERVATIVE SYSTEMS CLOSE TO LINEAR ONES | 55 |
| § 3. CASE OF NON-LINEAR FRICTION | 70 |
| § 4. AUTONOMOUS OSCILLATORY SYSTEMS | 80 |
| § 5. STATIONARY AMPLITUDES AND THEIR STABILITY | 91 |
| § 6. DEVELOPMENT OF STATIONARY SOLUTIONS | 104 |
| § 7. EQUIVALENT LINEARIZATION OF NON-LINEAR OSCILLATING SYSTEMS | 115 |
| § 8. NON-LINEAR OSCILLATING SYSTEMS WITH SLOWLY VARYING PARAMETERS | 133 |

CHAPTER 2

METHOD OF THE PHASE PLANE

| | |
|--|-----|
| § 9. TRAJECTORIES IN THE PHASE PLANE. SINGULAR POINTS | 144 |
| § 10. LIENARD'S METHOD | 166 |
| § 11. RELAXATION OSCILLATION SYSTEMS | 181 |
| § 12. METHOD OF A. A. DORODNITSIN FOR VAN-DER-POL EQUATION | 186 |

CHAPTER 3

INFLUENCE OF EXTERNAL PERIODIC FORCES

| | |
|--|-----|
| § 13. ASYMPTOTIC EXPANSIONS IN THE NON-RESONANCE CASE | 196 |
| § 14. RESONANCE CASES | 216 |
| § 15. THE INFLUENCE OF SINUSOIDAL FORCE ON A NON-LINEAR VIBRATOR | 236 |
| § 16. THE INFLUENCE OF A SINUSOIDAL FORCE ON A NON-LINEAR SYSTEM WITH A CHARACTERISTIC COMPOSED OF RECTILINEAR SEGMENTS | 254 |

| | | |
|-------|--|-----|
| § 17. | PARAMETRIC RESONANCE | 267 |
| § 18. | EFFECT OF PERIODIC FORCES ON A RELAXATION SYSTEM | 284 |
| § 19. | EFFECT OF PERIODIC FORCES ON NON-LINEAR SYSTEMS WITH SLOWLY VARYING PARAMETERS | 298 |

CHAPTER 4

MONOFREQUENCY OSCILLATIONS IN NON-LINEAR SYSTEMS WITH SEVERAL DEGREES OF FREEDOM

| | | |
|-------|--|-----|
| § 20. | NATURAL MONOFREQUENCY OSCILLATIONS IN SYSTEMS WITH SEVERAL DEGREES OF FREEDOM | 318 |
| § 21. | NATURAL MONOFREQUENCY OSCILLATIONS IN SYSTEMS WITH SEVERAL DEGREES OF FREEDOM, REPRESENTABLE BY A SYSTEM OF DIFFERENTIAL EQUATIONS OF THE SECOND ORDER | 334 |
| § 22. | EFFECT OF EXTERNAL PERIODIC FORCES ON MONOFREQUENCY OSCILLATIONS IN SYSTEMS WITH SEVERAL DEGREES OF FREEDOM | 350 |
| § 23. | ANALYSIS OF MONOFREQUENCY OSCILLATIONS IN NON-LINEAR SYSTEMS WITH SEVERAL DEGREES OF FREEDOM WHEN THERE ARE SLOWLY VARYING PARAMETERS | 366 |

CHAPTER 5

THE METHOD OF AVERAGING

| | | |
|-------|---|-----|
| § 24. | EQUATIONS OF THE FIRST AND HIGHER ORDER APPROXIMATIONS IN THE METHOD OF AVERAGING | 387 |
| § 25. | THE CASE OF THE RAPIDLY ROTATING PHASE | 412 |

CHAPTER 6

FOUNDATION OF ASYMPTOTIC METHODS

| | | |
|-------|--|-----|
| § 26. | FOUNDATION OF THE METHOD OF AVERAGING | 428 |
| § 27. | TRANSFORMATION OF THE BASIC SYSTEM OF EQUATIONS | 435 |
| § 28. | SOME PROPERTIES OF THE SOLUTIONS OF THE TRANSFORMED EQUATIONS IN THE NEIGHBOURHOOD OF EQUILIBRIUM POINTS AND CLOSED ORBITS | 465 |
| § 29. | CORRESPONDENCE BETWEEN EXACT AND APPROXIMATE SOLUTIONS OF THE FUNDAMENTAL EQUATION IN AN INFINITE INTERVAL | 497 |
| § 30. | PERIODIC AND ALMOST PERIODIC SOLUTIONS | 506 |
| | BIBLIOGRAPHY | 535 |