

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

