

CONTENTS

	<i>page</i>
1. INTRODUCTION—PURPOSE AND CONTENT OF THE BOOK	3
2. THE THEORY OF COMBINATION TONES	7
The Free Oscillations	12
3. OPERATIONAL FORM OF THE METHOD OF LINDSTED AND LIAPOUNOFF	13
I. Introduction	13
II. Free Vibrations of a Nonlinear Oscillator	13
III. The Vibrations of a Pendulum	20
IV. Nonlinear Electric Circuit	21
V. Oscillator Nonlinearly Damped	24
VI. Forced Nonlinear Vibrations	27
VII. Conclusion	30
Table of Transforms	31
4. THE METHOD OF REVERSION	33
I. Introduction	33
II. General Description of the Method	33
III. Examples Illustrating the Method	35
Solutions of differential equations (Ex. I–IV)	35
Series electric circuit with a nonlinear inductor (Ex. V)	41
General series circuit with a nonlinear inductor (Ex. VI)	44
Periodic electromotive force applied to a nonlinear Inductor (Ex. VII)	46
Nonlinear heat equation (Ex. VIII)	49
The case of $F(t)$ a unit step function	52
IV. Conclusion	52
V. The Multinomial Expansion Theorem	52
VI. The Reversion of a Special Equation	53

	<i>page</i>
5. SEQUENCE METHODS OF SOLUTION	57
I. Introduction	57
II. Nonlinear Electric Circuits	57
III. Circuit with a Nonlinear Resistance	60
IV. Circuit with a Nonlinear Inductor	61
Introduction	61
Notation and general equations	63
The basic equations	63
Negligible resistance: Harmonic excitation	64
The effect of small resistance in the circuit	66
The effect of a bias potential	67
The effect of large resistance in the inductor circuit	69
V. Forced Oscillation of a Linear Inductor and Capacitor in Series with a Nonlinear Inductor	71
Introduction and notation	71
The equation of the circuit	72
The first approximation for the current	75
VI. Forced Oscillation of a Damped Pendulum	78
Introduction	78
The equation of motion	78
The steady-state solution	80
VII. A Sequence Method Applicable to the Solution of Equations of the Form $\frac{d^2y}{dt^2} + \phi(t,y) = 0$	82
6. SUBHARMONIC RESONANCE	85
I. Subharmonic Resonance of a Series Electric Circuit	85
II. The Inverted Pendulum	90
The equation of motion	90
Approximate solution of the equation of motion	91
The theory of the superregenerator	93
III. General Theory of Nonlinear Subharmonic Resonance	94
Introduction	94
The perturbation theory of subharmonic resonance	94
IV. Subharmonic Resonance of a Nonlinear Mechanical Oscillator	97

