

# Contents

<b>1</b>	<b>Introduction</b>	1
<b>2</b>	<b>General Characteristic of Methods for STSP</b>	5
2.1	Analysis of Methods of Nonadaptive Spatial Signal Processing	5
2.2	Analysis of Peculiarities of Adaptive Spatial Signal Processing	9
2.3	Analysis of Non-structural Methods of Adaptive STSP	9
2.4	Analysis of Classical Structural Methods of Adaptive STSP	10
	References	15
<b>3</b>	<b>Background of Classical Theory of ASSP</b>	17
3.1	Analysis of Typical Description of Signal-Noise Situation	17
3.2	Introduction into System of Criteria of Optimality	19
3.3	Analysis of Algorithms of Adaptive Space-Time Signal Processing	26
	References	32
<b>4</b>	<b>Features of ASSP under Different Levels of A-Priori Uncertainty</b>	35
4.1	Analysis of Peculiarities of ASSP with Different Levels of A-Priori Uncertainty	35
4.2	Nature of a Priori Uncertainty about Properties of Signal and Noise	37
4.3	Methods of SSP under Generalized Parametric Uncertainty about the Noise Properties	40
4.4	Methods of SP under a Priory Parametric Uncertainty about Properties of Useful Signal	44
	References	49
<b>5</b>	<b>Algorithms of ASSP with Not Exactly Known Parameters</b>	51
5.1	Main Approaches for Development of Algorithms of ASSP with Not Exactly Known Parameters	51

5.2	Probabilistic Approach for Synthesis of Robust Algorithms of ASSP .....	53
5.3	Deterministic Approach: Robust Algorithms of ASSP for Modified Optimization Tasks .....	58
5.4	Restrictions for Value of Arbitrary Directivity Characteristic of Antenna .....	61
5.5	Additional Linear Restrictions .....	67
5.6	Restrictions of Standard Deviation for Directivity Characteristic of AA from the Given Value .....	70
5.7	Correlative Restrictions .....	73
5.8	Restrictions for the Shape of Amplitude-Phase Distribution of Currents in Channels of AA .....	74
5.9	Restriction for Value of Modulus of Output Signal of AA .....	76
5.10	Restrictions for Value of Norm of Weight Coefficients .....	77
5.11	Peculiarities of Robustnization for Algorithms of ASSP .....	77
5.12	Approximation of Control Vector by Section of Taylor Series .....	78
5.13	Projection Approach .....	80
5.14	Robustnization of ASSP Algorithms Using Nonlinear Transformations of Input Signals .....	82
5.15	Restrictions of Existed Methods of ASPS with Not Exactly Known Parameters .....	83
	References .....	85
6	<b>Background of ASSP with Not Exactly Known Parameters .....</b>	87
6.1	Elements of Axiomatic and Some Analogies .....	87
6.2	Generalized Linear Systems of Rayleigh and Centrosymmetric Matrices .....	90
6.3	Algorithms of ASF Basing on Operators' Construction in Banach Space .....	91
6.4	Methods of Construction of Operators .....	95
6.5	Minimax Approach for Operator's Construction and Principle of Comparison .....	110
6.6	Adaptive Approach for Construction of Operators .....	118
6.7	Optimization Tasks with Squared Restrictions of the Unstrict Inequalities Type .....	120
6.8	Construction of Optimization Tasks with Mixed Restrictions .....	128
6.9	Construction of Optimization Tasks with Generalized Mixed Restrictions .....	132
6.10	Conclusion .....	134
	References .....	136
7	<b>Synthesis of ASF Algorithms for Not Exactly Known Parameters .....</b>	139
7.1	Synthesis of Minimax Algorithms .....	139
7.2	Synthesis of Adaptive Algorithms .....	148

7.3	Synthesis of Algorithms for Adaptation of Structures of Operators to Current SIE .....	155
7.4	Analysis of Quality for ASF Algorithms for Signals with Not Exactly Known Parameters .....	162
	References .....	165
<b>8</b>	<b>Algorithms of ASP for Not Exactly Known Parameters .....</b>	<b>167</b>
8.1	Task of Synthesis for Algorithms of Spatial Partitioning as a Task of Operator Construction .....	167
8.2	Constructing Minimax Operators .....	171
8.3	Synthesis of Algorithms for Adaptive Spatial Signal Partition.....	175
8.4	Analysis of Quality of ASF Algorithms .....	185
8.5	Algorithm of ASF for Low-Element Antenna Arrays .....	193
	References .....	202
<b>9</b>	<b>Conclusion .....</b>	<b>205</b>
<b>A</b>	<b>Properties of Bundles and Centrosymmetric Matrices .....</b>	<b>209</b>
	References .....	218
<b>B</b>	<b>Inequalities for Matrix Norms and Proper Values of Bundles of Hermitian Forms .....</b>	<b>219</b>
	References .....	222
<b>C</b>	<b>Methodology for Construction of Centrosymmetric Matrices .....</b>	<b>223</b>
<b>D</b>	<b>Equivalence of Optimization Tasks .....</b>	<b>225</b>
	References .....	226
	<b>Index .....</b>	<b>227</b>