

## CONTENTS

<b>INTRODUCTION .....</b>	<b>6</b>
<b>DISSERTATION GOALS.....</b>	<b>7</b>
<b>1 SELF-ORGANIZATION IN NATURAL SYSTEMS.....</b>	<b>8</b>
1.1 STOCHASTIC ELEMENT IN NATURAL SYSTEMS.....	9
1.2 SELF-ORGANIZATION PRODUCED BY THERMODYNAMIC FLOWS.....	9
1.3 PHYSICAL-CHEMICAL AND BIOLOGICAL APPROACH TO DIFFUSION.....	13
<b>2 MODELING IN CONTEMPORARY WORLD.....</b>	<b>17</b>
2.1 FRACTAL MODELING APPROACH.....	17
2.2 MARKOV CHAINS.....	18
2.3 MONTE CARLO METHODS.....	19
2.4 REGRESSION ANALYSIS.....	20
<b>3 COMPUTER DEVELOPMENT ENVIRONMENT.....</b>	<b>21</b>
3.1 NI LABVIEW 7.1.....	21
3.2 NI VISION .....	21
3.3 NI DATA ACQUISITION .....	22
<b>4 MODELING OF DISSOLUTION AND SWELLING PROCESSES STUDIED BY INTERFEROMETRIC METHOD WITH A PRACTICAL APPLICATION OF REGRESSION ANALYSIS.....</b>	<b>23</b>
4.1 MAIN PRINCIPLES OF INTERFEROMETRIC METHOD FOR DESCRIPTION OF DIFFUSION PROCESS.....	23
4.2 SYSTEM FOR ANALYSIS OF INTERFEROGRAMS.....	25
<b>5 MODELING OF SELF-ORGANIZATION PROCESSES WITH STOCHASTIC STRUCTURE BY THERMODYNAMIC FLOWS.....</b>	<b>26</b>
5.1 MAIN PRINCIPLES OF THERMODYNAMIC FLOWS AND BÉNARD CELLS FORMATION.....	26
5.2 INTELLIGENT SYSTEM FOR CONTROLLING OF BÉNARD CELLS FORMATION.....	26
5.3 MODEL COMPARISON WITH EXPERIMENTAL PROJECTS.....	28
<b>6 CONCLUSIONS AND RECOMMENDATION.....</b>	<b>29</b>
6.1 DIFFUSION IN POLYMER GELS.....	29
6.2 SELF-ORGANIZATION OF BÉNARD CELLS.....	30
<b>REFERENCES.....</b>	<b>32</b>
<b>LIST OF PUBLICATIONS.....</b>	<b>35</b>