

# Contents

<b>1</b>	<b>Introduction and Motivation</b>	<b>7</b>
1.1	Motivation . . . . .	7
1.2	Current state of art . . . . .	7
1.3	Nonlinear ST modulation, coding and signal processing . . . . .	7
1.4	Outline of the text . . . . .	8
<b>2</b>	<b>MIMO Radio Communication System</b>	<b>9</b>
2.1	System model . . . . .	9
2.2	Fundamental limits . . . . .	9
2.3	Space-Time Modulation and Coding . . . . .	11
<b>3</b>	<b>Nonlinear Space-Time Modulation and Coding</b>	<b>13</b>
3.1	Nonlinear space-time modulator . . . . .	13
3.2	Waveform and memory constraint . . . . .	14
3.3	Channel . . . . .	14
3.4	Multidimensional constellation waveform space model . . . . .	14
3.5	Waveform Space channel model for NSTM . . . . .	15
<b>4</b>	<b>Fundamental limits for NSTM</b>	<b>16</b>
4.1	Channel capacity of NSTM with multidimensional waveform constellation . . . . .	16
4.2	Symmetric capacity of finite alphabet NSTM . . . . .	17
<b>5</b>	<b>Trellis space-time coding for NSTM of CPM type</b>	<b>20</b>
5.1	Distance evaluation trellis . . . . .	20
5.2	NSTM-CPM trellis code design principle . . . . .	21
<b>6</b>	<b>Nonlinear Signal Processing for NSTM</b>	<b>22</b>
6.1	Equivalent system model with composite coefficients . . . . .	22
6.2	Information waveform manifold . . . . .	22
6.3	Nonlinear projector on IWM . . . . .	23
6.4	Signal processing on the IWM . . . . .	24
6.5	Isomorphism between IWM and decoder metric . . . . .	25
6.6	2-Component IWM Phase Discriminator . . . . .	25
6.7	Information sufficiency of the nonlinear projector . . . . .	26
6.8	Multiplexing Properties of the Discriminator . . . . .	26