

Contents

0.1	Motivation	i
0.2	Notes and remarks	ii
0.2.1	Moment's problem	ii
0.2.2	$L^2(\mathbf{m})$ spaces from the point of view of the vector measure theory	iv
0.3	Applications	v
0.4	The structure of the thesis	vi
1	Notation and Preliminaries	1
1.1	Basic notions	1
1.2	Unconditional basis in $L^2(\mathbf{m})$	7
1.3	<i>Kadec – Pelczyński</i> decomposition	13
2	m–Orthogonal sequences with respect to a vector measure	19
2.1	m–Orthogonal sequences of functions with respect to a vector measure	19
2.2	Weak m–orthogonal sequences	20
2.3	m–Orthogonal sequences	25
2.4	Strongly m–orthogonality	31
3	The Menchoff-Rademacher Theorem for $L^2(\mathbf{m})$	39
3.1	About almost everywhere convergence of sequences in $L^2(\mathbf{m})$	41
3.2	The Menchoff-Rademacher Theorem for weak m–orthogonal sequences	44
3.3	Almost everywhere convergence in c_0 -sums of $L^2(\mu)$ spaces	50
4	Pointwise dependent Fourier coefficients	53
4.1	Pointwise dependent Fourier coefficients	54
4.2	Continuity of the pointwise dependent Fourier coefficients	62
4.3	An example of approximation with finite m–orthogonal sequences	65
4.4	Application to acoustic data	72
References		77