Списък публикации с резюмета
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(1) P. Casazza, O. Christensen and D. T. Stoeva: Frame expansions in separable Banach spaces. *J. Math. Anal. Appl.* **307** (2005), 710–723.

Abstract. Banach frames and X_d-frames are generalization of (Hilbert space) frames. While Hilbert frames always imply series expansions in Hilbert spaces, this is not so in the general case of Banach spaces. In this paper we characterize Banach frames and X_d-frames in separable Banach spaces, and relate them to series expansions in Banach spaces. In particular, the results in the paper show that one can not expect Banach frames to share all the nice properties of frames in Hilbert spaces.

(2) D. T. Stoeva: On p-frames and reconstruction series in separable Banach spaces, *Integral Transforms Spec. Funct.* **17** No. 2-3 (2006), 127–133.

Abstract. It is well known that a frame $\{g_i\}$ for a Hilbert space $\mathcal{H}$ allows every element $f \in \mathcal{H}$ to be represented as $f = \sum \langle f, f_i \rangle g_i = \sum \langle f, g_i \rangle f_i$ via the frame elements and a dual frame $\{f_i\}$, $f_i \in \mathcal{H}$. For some generalizations of frames to Banach spaces (Banach frames, p-frames) such representations are not always possible. For a given sequence $\{g_i\}$ with elements in the dual X^* of a Banach space X, we discuss the p-frame condition and validity of series expansions in the form $g = \sum d_i g_i$ for appropriate coefficients $\{d_i\}$, and also reconstruction series in the form $f = \sum g_i(f) f_i$, $f \in X$, and $g = \sum g(f_i) g_i$, $g \in X^*$, via appropriate sequence $\{f_i\}$, $f_i \in X$. In particular, we show that a Banach frame w.r.t. ℓ^p always leads to the desired representations; however, general Banach frames do not.

(3) S. Pilipović, D. T. Stoeva, N. Teofanov, Frames for Fréchet spaces, *Bull. Cl. Sci. Math. Nat. Sci. Math* **32** (2007), 69–84.

Abstract. In this paper we study frame representations in projective and inductive limits of Banach spaces. We introduce the notion of a Fréchet pre-frame for a given Fréchet space with respect to a Fréchet sequence space. Main results of the paper include the use of density arguments and representations in the case of projective limits of isomorphic reflexive Banach spaces. Examples based on modulation spaces, Sobolev type spaces and Köthe type spaces are given.

(4) D. T. Stoeva: Generalization of the frame operator and the canonical dual frame to Banach spaces, *Asian-Eur. J. Math.* **1** No. 4 (2008), 631–643.

Abstract. X_d-frames for Banach spaces are generalization of Hilbert frames. In this paper we extend the concepts *frame operator* and *canonical dual* to the case of X_d-frames. For a given X_d-frame $\{g_i\}$ for the Banach space X we define an *X_d-frame map* $\mathbb{S} : X \to X^*$ and determine conditions, which imply that $\mathbb{S}$ is invertible and the family $\{\mathbb{S}^{-1} g_i\}$ is an X_d^*-frame for X^* such that $f = \sum g_i(f) \mathbb{S}^{-1} g_i$ for every $f \in X$ and $g = \sum g(\mathbb{S}^{-1} g_i) g_i$ for every $g \in X^*$. If X is a Hilbert space and $\{g_i\}$ is a frame for X, then the ℓ^2-frame map

$\mathbb{S}$ gives the frame operator S and the family $\{\mathbb{S}^{-1}g_i\}$ coincides with the canonical dual of $\{g_i\}$.

(5) D. T. Stoeva: *X_d-Riesz bases in separable Banach spaces*, "Collection of papers, ded. to the 60th Anniv. of M. Konstantinov", in press.

Abstract. When X is a Banach space and X_d is a Banach sequence space, an X_d-Riesz basis for X is a sequence $\{g_i\}_{i=1}^\infty$, $g_i \in X$, which is complete in X and such that $A\|\{c_i\}_{i=1}^\infty\|_{X_d} \leq \|\sum_{i=1}^\infty c_i g_i\|_X \leq B\|\{c_i\}_{i=1}^\infty\|_{X_d}$ for every $\{c_i\}_{i=1}^\infty \in X_d$. In the present paper X_d-Riesz bases for Banach spaces are investigated. Their connection to X_d^*-frames is determined. Equivalent conditions for a sequence to form an X_d-Riesz basis are given.

(6) D. T. Stoeva: X_d-frames in Banach spaces and their duals, *Int. J. Pure Appl. Math.* **52** No. 1 (2009), 1–14. (invited paper)

Abstract. We consider consequences of the lower and the upper X_d-frame conditions. The lower X_d-frame condition is proved to be necessary for existence of some series expansions. Our main interest is on duals and dual*s. We consider connection between dual and dual* of an X_d-Bessel sequence, and necessary and sufficient conditions for their existence. If X_d has the canonical vectors as a Schauder basis, then an X_d-Bessel sequence, having a dual or dual*, is moreover a Banach frame.

(7) S. Pilipović, D. T. Stoeva, Series expansions in Fréchet spaces and their duals, construction of Fréchet frames, *J. Approx. Theory* **163** (2011), 1729–1747. (preprint on Arxiv 2008, arXiv:0809.4647)

Abstract. Frames for Fréchet spaces X_F with respect to Fréchet sequence spaces Θ_F are studied and conditions, implying series expansions in X_F and X_F^*, are determined. If $\{g_i\}_{i=1}^\infty$ is a Θ_0-frame for X_0 and Θ_F (resp. X_F) is given, we construct a sequence $\{X_s\}_{s\in\mathbb{N}_0}$, $X_s \subset X_{s-1}$, $s \in \mathbb{N}$, (resp. $\{\Theta_s\}_{s\in\mathbb{N}_0}$, $\Theta_s \subset \Theta_{s-1}$, $s \in \mathbb{N}$), so that $\{g_i\}_{i=1}^\infty$ is a pre-F-frame or F-frame for X_F with respect to Θ_F under different assumptions given on X_0, Θ_0 and Θ_F (resp. X_F).

(8) S. Pilipović, D. T. Stoeva, Analysis of conditions for frame functions, examples with the orthogonal functions, *Integral Transforms Spec. Funct.* **22** Nos.4-5 (2011), 311–318. (preprint on Arxiv 2008, arXiv:0811.3182)

Abstract. We analyze properties of frame functions $g_i, i \in \mathbb{N}_0$, and spaces $\breve{\Theta}$, resp. $\{\breve{\Theta}_s\}_{s\in\mathbb{N}_0}$, in order to have $\{g_i\}$ as a Banach frame for a Banach space X w.r.t. $\breve{\Theta}$, resp. Fréchet frame for a Fréchet space $X_F = \cap_{s\in\mathbb{N}_0} X_s$ w.r.t. $\cap_{s\in\mathbb{N}_0}\breve{\Theta}_s$. Examples with orthogonal functions in Hilbert spaces describes the assertions.

(9) D. T. Stoeva, P. Balazs, Invertibility of multipliers, *Appl. Comput. Harmon. Anal.*, 2011, doi:10.1016/j.acha.2011.11.001. (preprint of older version on Arxiv 2009, arXiv:0911.2783)

Abstract. In the present paper the invertibility of multipliers is investigated in detail. Multipliers are operators created by (frame-like) analysis, multiplication by a fixed symbol, and resynthesis. Sufficient and/or necessary conditions for invertibility are determined depending on the properties of the analysis and synthesis sequences, as well as the symbol. Examples are given, showing that the established bounds are sharp. If a multiplier is invertible, a formula for the inverse operator is determined and n-term error bounds are given. The case when one of the sequences is a Riesz basis is completely characterized.

(10) P. Balazs, D. T. Stoeva, J.-P.Antoine, Classification of general sequences by frame-related operators. *Sampl. Theory Signal Image Process.* **10**, No.1-2 (2011), 151-170. (preprint on Arxiv 2010, arXiv:1009.1496)

Abstract. This paper is a survey and collection of results, as well as presenting some original research. For Bessel sequences and frames, the analysis, synthesis and frame operators as well as the Gram matrix are well-known, bounded operators. We investigate these operators for arbitrary sequences, which in general lead to possibly unbounded operators. We characterize various classes of sequences in terms of these operators and vice-versa. Finally, we classify these sequences by operators applied on orthonormal bases.

(11) D. T. Stoeva, Perturbation of frames for Banach spaces, *Asian-Eur. J. Math.* Accepted (2011). (preprint on Arxiv 2009, arXiv:0902.3602)

Abstract. In this paper we consider perturbation of several frame-concepts in separable Banach spaces. We determine stability conditions with sharp bounds and discuss the necessity of some of them. Further, we investigate equivalence between several perturbation conditions.

(12) D. T. Stoeva, P. Balazs, *Weighted frames and frame multipliers*, Proceedings of the International Conference UACEG2009: Science & Practice, Annual of the University of Architecture, Civil Engineering and Geodesy, vol. XIII-XIV, 2004-2009, 33–42.

Abstract. Weighted frames and frame multipliers have been recently introduced and are naturally connected. Frames together with semi-normalized weights always lead to weighted frames. Here we proof further connections between a sequence $(\phi_n)_{n=1}^{\infty}$ and the weighted sequence $(m_n\phi_n)_{n=1}^{\infty}$. Furthermore we show that for semi-normalized weights and invertible multipliers, if one of the involved sequences is a Riesz basis, the other also has to be.

(13) D. T. Stoeva, P. Balazs, *Can any unconditionally convergent multiplier be transformed to have the symbol (1) and Bessel sequences by shifting weights?* (preprint on Arxiv 2011, arXiv:1108.5629)

Abstract. Multipliers are operators that combine (frame-like) analysis, a multiplication with a fixed sequence, called the symbol, and synthesis. They are very interesting mathematical objects that also have a lot of applications for example in acoustical signal processing. It is known that bounded symbols and Bessel sequences guarantee unconditional convergence. In this paper we investigate necessary and equivalent conditions for the unconditional convergence of multipliers. In particular we show that, under mild conditions, unconditionally convergent multipliers can be transformed by shifting weights between symbol and sequence, into multipliers with symbol (1) and Bessel sequences.

(14) D. T. Stoeva: *Characterization of atomic decompositions, Banach frames, X_d-frames, duals and synthesis- pseudo-duals, with application to Hilbert frame theory.* (preprint on Arxiv 2011, arXiv:1108.6282)

Abstract. In this paper we give a characterization of atomic decompositions, Banach frames, X_d-Riesz bases, X_d-frames, X_d-Bessel sequences, sequences satisfying the lower X_d-frame condition, duals of X_d-frames and synthesis pseudo-duals, based on an operator acting on the canonical basis of a sequence space. We discuss expansions in X and X^*. Further, we consider necessary and sufficient conditions on operators to preserve the sequence type of the listed concepts. As a consequence, we solve some problems in Hilbert frame theory.

(15) D. T. Stoeva, P. Balazs, *Representation of the inverse of a multiplier as a multiplier.* (preprint on Arxiv 2011, arXiv:1108.6286)

Abstract. Frame multipliers are interesting mathematical objects consisting of analysis, multiplication by a fixed sequence (called the symbol), and synthesis. Since they are important for applications, for example for the realization of time-varying filters, their inversion is of interest. For Riesz bases and semi-normalized symbols, it is known that the inverse of the multiplier can be found by using the biorthogonal sequences and the reciprocal symbol. In this paper we extend the class of multipliers where the inverse is represented by a multiplier. In particular, we show that for semi-normalized symbols any invertible frame multiplier can be represented as a frame multiplier with dual sequences. Furthermore, we give sufficient conditions, so that the inverse involves the reciprocal symbol and the canonical duals.

(16) S. Pilipović, D. T. Stoeva, *Fréchet frames, general definition and expansions* (preprint on Arxiv 2012, arXiv:1201.2096)

Abstract. We define an (X_1, Θ, X_2)-*frame* with Banach spaces $X_2 \subset X_1$, $\|\cdot\|_1 \leq \|\cdot\|_2$, and a BK-space $(\Theta, |||\cdot|||)$. Then by the use of decreasing sequences of Banach spaces $\{X_s\}_{s=0}^{\infty}$ and $\{\Theta_s\}_{s=0}^{\infty}$, we define a general Fréchet frame on the Fréchet space $X_F = \bigcap_{s=0}^{\infty} X_s$. The main assertion gives expansions of elements of X_F and its dual X_F^*, as well of X_s and X_s^*.