

FRAME INEQUALITIES IN HILBERT SPACES: TWO-SIDED INEQUALITIES WITH NEW STRUCTURES

ZHONG-QI XIANG, CHUN-XIA LIN AND XIANG-CHUN XIAO

Abstract. This paper is devoted to establishing frame inequalities in Hilbert spaces. By using operator theory methods, several two-sided inequalities for frames are presented, which, comparing to previous inequalities on frames and generalized frames, admit new structures.

Mathematics subject classification (2020): 42C15, 42C40, 47B48.

Keywords and phrases: Frame, Parseval frame, alternate dual frame, inequality.

REFERENCES

- [1] M. R. ABDOLLAHPOUR, M. H. FAROUGHI, *Continuous g -frames in Hilbert Spaces*, Southeast Asian Bull. Math. **32** (2008), 1–19.
- [2] R. BALAN, P. G. CASAZZA, D. EDIDIN, G. KUTYNIOK, *A new identity for Parseval frames*, Proc. Amer. Math. Soc. **135** (2007), 1007–1015.
- [3] P. BALAZS, N. HOLIGHAUS, T. NECCIARI, D. T. STOEVA, *Frame theory for signal processing in psychoacoustics*, in: R. Balan, J. Benedetto, W. Czaja, M. Dellatorre, K. Okoudjou (Eds.), *Excursions in Harmonic Analysis*, vol. 5, Applied and Numerical Harmonic Analysis, Birkhäuser, Cham, 2017, pp. 225–268.
- [4] P. G. CASAZZA, G. KUTYNIOK, *Frames of subspaces*, in: *Wavelets, Frames and Operator Theory*, in: *Contemp. Math.*, vol. 345, Amer. Math. Soc., Providence, RI, 2004, pp. 87–113.
- [5] I. DAUBECHIES, A. GROSSMANN, Y. MEYER, *Painless nonorthogonal expansions*, J. Math. Phys. **27** (1986), 1271–1283.
- [6] R. J. DUFFIN, A. C. SCHAEFFER, *A class of nonharmonic Fourier series*, Trans. Am. Math. Soc. **72** (1952), 341–366.
- [7] M. H. FAROUGHI, R. AHMADI, *Some properties of C -fusion frames*, Turk. J. Math. **34** (2010), 393–415.
- [8] Y. L. FU, W. ZHANG, *Some new inequalities for dual continuous g -frames*, Mathematics **7** (2019), Article 662, 15 pp.
- [9] P. GÄVRUȚA, *On some identities and inequalities for frames in Hilbert spaces*, J. Math. Anal. Appl. **321** (2006), 469–478.
- [10] Q. P. GUO, J. S. LENG, H. B. LI, *Some equalities and inequalities for fusion frames*, SpringerPlus, **5** (2016), Article 121, 10 pp.
- [11] A. KHOSRAVI, B. KHOSRAVI, *Fusion frames and g -frames in Hilbert C^* -modules*, Int. J. Wavelets Multiresolut. Inf. Process. **6** (2008), 433–446.
- [12] D. W. LI, J. S. LENG, *On some new inequalities for fusion frames in Hilbert spaces*, Math. Inequal. Appl. **20** (2017), 889–900.
- [13] D. W. LI, J. S. LENG, *On some new inequalities for continuous fusion frames in Hilbert spaces*, Mediterr. J. Math. **15** (2018), Article 173, 15 pp.
- [14] I. Z. PESENSON, *Paley-Wiener-Schwartz nearly Parseval frames on noncompact symmetric spaces*, Commutative and Noncommutative Harmonic Analysis and Applications, *Contemp. Math.*, vol. 603, Amer. Math. Soc., Providence, RI, 2013, pp. 55–71.
- [15] C. POON, *A consistent and stable approach to generalized sampling*, J. Fourier Anal. Appl. **20** (2014), 985–1019.

- [16] A. PORIA, *Some identities and inequalities for Hilbert-Schmidt frames*, *Mediterr. J. Math.* **14** (2017), Article 59, 14 pp.
- [17] W. C. SUN, *Asymptotic properties of Gabor frame operators as sampling density tends to infinity*, *J. Funct. Anal.* **258** (2010), 913–932.
- [18] Z. Q. XIANG, *New inequalities for g -frames in Hilbert C^* -modules*, *J. Math. Inequal.* **10** (2016), 889–897.
- [19] Z. Q. XIANG, *New inequalities of K - g -frames in submodules*, *Bull. Iran. Math. Soc.* **48** (2022), 627–641.
- [20] W. ZHANG, Y. Z. LI, *New inequalities and erasures for continuous g -frames*, *Math. Rep.* **20** (2018), 263–278.