

CONSTRUCTION OF PAIRWISE ORTHOGONAL PARSEVAL FRAMES GENERATED BY FILTERS ON LCA GROUPS

NAVNEET REDHU, ANUPAM GUMBER, AND NIRAJ K. SHUKLA

ABSTRACT. The generalized translation invariant (GTI) systems unify the discrete frame theory of generalized shift-invariant systems with its continuous version, such as wavelets, shearlets, Gabor transforms, and others. This article provides sufficient conditions to construct pairwise orthogonal Parseval GTI frames in $L^2(G)$ satisfying the local integrability condition (LIC) and having the Calderón sum one, where G is a second countable locally compact abelian group. The pairwise orthogonality plays a crucial role in multiple access communications, hiding data, synthesizing superframes and frames, etc. Further, we propose algorithms for constructing N numbers of GTI Parseval frames, which are pairwise orthogonal. Consequently, we obtain an explicit construction of pairwise orthogonal Parseval frames in $L^2(\mathbb{R})$ and $L^2(G)$, using B-splines as a generating function. In the end, the results are particularly discussed for wavelet systems.

DEPARTMENT OF MATHEMATICS, INDIAN INSTITUTE OF TECHNOLOGY INDORE, SIMROL, KHANDWA ROAD, INDORE-453 552.

NUHAG, FACULTY OF MATHEMATICS, UNIVERSITY OF VIENNA, OSKAR-MORGENSTERN-PLATZ 1,1090 VIENNA, AUSTRIA

Email address: phd2001141011@iiti.ac.in (Navneet Redhu), anupam.gumber@univie.ac.at (Anupam Gumber), nirajshukla@iiti.ac.in (Niraj K. Shukla)

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