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

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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.

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