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GROUP RECONSTRUCTION SYSTEMS*

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Abstract. We consider classes of reconstruction systems (RS's) for finite dimensional real or complex Hilbert spaces \mathcal{H} , called group reconstruction systems (GRS's), that are associated with representations of finite groups \mathcal{G} . These GRS's generalize frames with high degree of symmetry, such as harmonic or geometrically uniform ones. Their canonical dual and canonical Parseval are shown to be GRS's. We establish simple conditions for one-erasure robustness. Projective GRS's, that can be viewed as fusion frames, are also considered. We characterize the Gram matrix of a GRS in terms of block group matrices. Unitary equivalences and unitary symmetries of RS's are studied. The relation between the irreducibility of the representation and the tightness of the GRS is established. Taking into account these results, we consider the construction of Parseval, projective and one-erasure robust GRS's.

Key words. Reconstruction systems, Fusion frames, g-frames, Group representation, Robustness, Gram matrix.

AMS subject classifications. 42C15, 42C40, 20C15, 05B20, 15A60.

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