Napp, Diego; Pinto, Raquel; Rocha, Conceição
State representations of convolutional codes over a finite ring. (English) Zbl 07483317
Linear Algebra Appl. 640, 48-66 (2022)

Summary: In this paper we study finite support convolutional codes over \( \mathbb{Z}_p^r \) by means of an input-state-output representation. We show that the set of finite weight input-state-output trajectories associated to this type of representations has the structure of a \( \mathbb{Z}_p^r \)-submodule of \( \mathbb{Z}_n^p \) and therefore is a (finite support) convolutional code. Fundamental system-theoretical properties such as observability, reachability or minimality, are investigated in this context.

MSC:
14G50 Applications to coding theory and cryptography of arithmetic geometry
11T71 Algebraic coding theory; cryptography (number-theoretic aspects)
47A48 Operator colligations (= nodes), vessels, linear systems, characteristic functions, realizations, etc.
93B15 Realizations from input-output data
94B10 Convolutional codes

Keywords:
finite rings; realization theory; convolutional

Full Text: DOI

References:


Kuijper, M.; Schindelar, K., Minimal Gröbner bases and the predictable leading monomial property, Linear Algebra Appl., 434, 1, 104-116 (2011) · Zbl 1200.14050


Lieb, J.; Rosenthal, J., Erasure decoding of convolutional codes using first order representations (2020), Arxiv


Massey, J. L.; Mittelholzer, T., Convolutional codes over rings, (Proc. 4th Joint Swedish-Soviet Int. Workshop Information Theory (1989)), 14-18


Napp, D.; Pinto, R.; Rocha, C., Noncatastrophic convolutional codes over a finite ring, J. Algebra Appl., 0, 0, Article 2350029 pp. (2021)


Carriegos, M. V.; DeCastro-García, N.; Muñoz Castañeda, A. L., Linear representations of convolutional codes over rings (2016), pp. 1-17


Zerz, E., On multidimensional convolutional codes and controllability properties of multidimensional systems over finite rings, Asian J. Control, 12, 2, 119-126 (2010)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.