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Matrices of morphisms preserving 3-interval exchange transformation words

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Abstract

We study matrices of morphisms preserving the family of words coding 3-interval exchange transformations. It is well known (Berstel, Mignosi and Séébold) that matrices of morphisms preserving sturmian words (i.e. words coding 2-interval exchange transforations with the maximal possible subword complexity) form the monoid

$$\{\boldsymbol{M} \in \mathbb{N}^{2\times 2} \mid \det \boldsymbol{M} = \pm 1\} = \{\boldsymbol{M} \in \mathbb{N}^{2\times 2} \mid \boldsymbol{M}\boldsymbol{E}\boldsymbol{M}^T = \pm \boldsymbol{E}\}$$

where $\boldsymbol{E} = \left(\begin{smallmatrix} 0 & 1 \\ -1 & 0 \end{smallmatrix}\right)$.

We prove that in the case of 3-interval exchange transformations the matrices preserving words coding these transformations and having the maximal possible subword complexity belong to the monoid

$$\{\boldsymbol{M} \in \mathbb{N}^{3\times 3} \mid \boldsymbol{M}\boldsymbol{E}\boldsymbol{M}^T = \pm \boldsymbol{E} \text{ and } \det \boldsymbol{M} = \pm 1\}$$

where $\boldsymbol{E} = \left(\begin{smallmatrix} 0 & 1 & 1 \\ -1 & 0 & 1 \\ -1 & -1 & 0 \end{smallmatrix}\right)$.

This is joint work with Z. Masáková and E. Pelantová.