

# Transformed rank-1 lattices for high-dimensional approximation

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We describe an extension of Fourier approximation methods for multivariate functions defined on the torus  $\mathbb{T}^d$  to functions defined on unbounded domains via a multivariate change of coordinate mapping. In this approach we adapt algorithms for the evaluation and reconstruction of multivariate trigonometric polynomials based on single and multiple reconstructing rank-1 lattices and make use of dimension incremental construction methods for sparse frequency sets. We also describe sufficient conditions on the change of coordinate mappings which guarantee that the transformed functions belong to the standard Sobolev space  $H^m(\mathbb{T}^d)$  with smoothness order  $m \in \mathbb{N}$ . Various numerical tests confirm obtained theoretical results for the transformed methods.