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Anisotropic Dilations of Shift-Invariant Subspaces and Approximation Properties in $L^2(\mathbb{R}^d)$.

Let A be an expansive linear map in \mathbb{R}^d . Approximation properties of shift-invariant subspaces of $L^2(\mathbb{R}^d)$ when they are dilated by integer powers of A are studied. Shift-invariant subspaces providing approximation order α or density order α associated to A are characterized. These characterizations impose certain restrictions on the behavior of the spectral function at the origin expressed in terms of the concept of point of approximate continuity. The notions of approximation order and density order associated to an isotropic dilation turn out to coincide with the classical ones introduced by de Boor, DeVore and Ron. This is no longer true when A is anisotropic. In this case the A -dilated shift-invariant subspaces approximate the anisotropic Sobolev space associated to A and α . Our main results are also new when S is generated by translates of a single function. The obtained results are illustrated by some examples. (Received March 05, 2015)