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A Classification of n-tuples of Commuting Isometries

Let $\mathbb{V}$ denote an n-tuple of shifts of finite multiplicity, and denote by $\mathrm{Ann}\,(\mathbb{V})$ the ideal consisting of polynomials p in n complex variables such that $p(\mathbb{V}) = 0$. If $\mathbb{W}$ on $\mathfrak{K}$ is another n-tuple of shifts of finite multiplicity, and there is a $\mathbb{W}$-invariant subspace $\mathfrak{K}'$ of finite codimension in $\mathfrak{K}$ so that $\mathbb{W}|\mathfrak{K}'$ is similar to $\mathbb{V}$, then we write $\mathbb{V} \lesssim \mathbb{W}$. If $\mathbb{W} \lesssim \mathbb{V}$ as well, then we write $\mathbb{W} \approx \mathbb{V}$.

In the case that $\mathrm{Ann}\,(\mathbb{V})$ is a prime ideal we show that the equivalence class of $\mathbb{V}$ is determined by $\mathrm{Ann}\,(\mathbb{V})$ and a positive integer k. More generally, the equivalence class of $\mathbb{V}$ is determined by $\mathrm{Ann}\,(\mathbb{V})$ and an m-tuple of positive integers, where m is the number of irreducible components of the zero set of $\mathrm{Ann}\,(\mathbb{V})$.