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## On polynomial $n$ -tuples of commuting isometries

### Abstract

We extend some of the results of Agler, Kneese, and McCarthy concerning pairs of commuting shifts to the case of  $n$ -tuples of commuting isometries, where  $n > 2$ . Let  $V = (V_1, \dots, V_n)$  be an  $n$ -tuple of commuting isometries on a Hilbert space and let  $\text{Ann}(V)$  denote the set of all  $n$ -variable polynomials  $p$  such that  $p(V) = 0$ . When  $\text{Ann}(V)$  defines an affine algebraic variety of dimension 1 and  $V$  is completely non-unitary, we show that  $V$  decomposes as a direct of  $n$ -tuples  $(W_1, \dots, W_n)$  with the property that, for each  $i$ ,  $W_i$  is either a shift or a scalar multiple of the identity. If  $V$  is a cyclic  $n$ -tuple of commuting shifts, then we show that  $V$  is determined by  $\text{Ann}(V)$  up to near unitary equivalence.

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