1027-16-179 **Ellen E. Kirkman*** (kirkman@wfu.edu), Department of Mathematics, Wake Forest University Box 7388, Winston Salem, NC 27109, and **James J. Kuzmanovich** and **J. J. Zhang**.
*Reflections of Regular Algebras I.*

Let $G$ be a finite group of matrices acting linearly on a commutative polynomial ring $\mathbb{C}[x_1, \ldots, x_n]$. The Shephard-Todd-Chevalley Theorem states that the fixed subring $\mathbb{C}[x_1, \cdots, x_n]^G$ is a polynomial ring if and only if $G$ is generated by reflections (matrices whose invariant subspace is of co-dimension 1).

To generalize this theorem to a noncommutative setting, we consider finite groups of matrices acting on an Artin-Schelter regular algebra $A$. Examples suggest that the proper generalization of the Shephard-Todd-Chevalley Theorem is to find conditions on $G$ so that the fixed subring $A^G$ is AS-regular. We present a new notion of "reflection" (that we call quasi-reflection), and prove that if $A^G$ is AS-regular, then $G$ must contain a quasi-reflection of $A$. Regular algebras with no quasi-reflections must have $A^G$ of infinite global dimension, and such algebras include 2-generated AS-regular algebras of global dimension 3 or 4, and certain homogenizations of $U(\mathfrak{g})$, for $\mathfrak{g}$ a finite dimensional Lie algebra. Examples suggest that the further generalization to "bi-reflection" is also of interest. (Received February 26, 2007)