

**Meeting:** 1001, Evanston, Illinois, SS 23A, Special Session on Mathematical Techniques in Musical Analysis

1001-00-84            **Julian Hook\*** (juhoo@indiana.edu), School of Music, Indiana University, Bloomington, IN 47405. *Toward a General Theory of Key Signatures and Enharmonic Equivalence*. Preliminary report.

Musical key signatures are modeled as "signature vectors," seven-dimensional vectors over the integers, each coordinate indicating the "sharpness" or "flatness" associated with a certain diatonic scale degree. Several musically meaningful operations on signature vectors are studied, and a definition of "standard" signature vectors (those corresponding to the key signature of some major or minor key) is formulated. These definitions do not depend on any convention for enharmonic equivalence of pitch classes. Enharmonic equivalence conditions may, however, also be formalized in terms of signature vectors; the canonical equivalence conditions give rise to a twelve-pc "enharmonic system," but other systems are possible. Under certain assumptions, these systems share many of the standard properties arising in diatonic set theory (maximal evenness, well-formedness, Myhill's property). "Diatonic forms" (fragments of music written in some key signature) may be realized within any enharmonic system. Diatonic forms are acted upon by various transformations, whose group structure is of some interest. Some applications of nonstandard signature vectors are shown. The concepts described are illustrated with musical examples from the Twelve Microtonal Etudes by Easley Blackwood. (Received August 11, 2004)