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William P. Orrick* (worrick@indiana.edu), Department of Mathematics, Indiana University, Bloomington, IN 47405. *Classification of Hadamard matrices by switching and codes.*

Classification of Hadamard matrices up to equivalence under signed permutations of rows and columns has been achieved only up to size 28. Although even the existence of Hadamard matrices of general size is not a settled question, it is believed that a combinatorial explosion in the number of equivalence classes occurs, starting with size 32. One could hope that understanding the nature of this combinatorial explosion would shed some light on the existence question.

Brendan McKay suggested a practical computational method, based on graph isomorphism, for distinguishing equivalence classes, and Jeffrey Leon devised an alternative algorithm tailored specifically for the Hadamard matrix problem. How to generate large numbers of equivalence classes in the first place is one question that I will address in this talk. The method uses switching operations, which not only provide a method for rapidly producing many equivalence classes, but also give rise to more coarse-grained notions of equivalence. These new notions of equivalence turn out to be refinements of integer equivalence or of equivalence relations relating to the codes of Hadamard matrices. Computations suggest that the new equivalence relations go a long way towards taming the combinatorial explosion. (Received September 20, 2007)