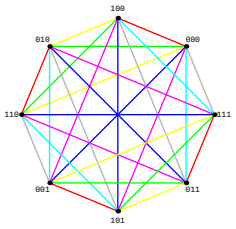
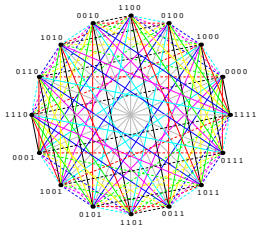
Discrete Mathematics and Optimization Seminar

F2002



Jointly Organized by
School of Computer Science and
Department of Mathematics and Statistics



September 11 (Wednesday), 17:00 – 18:00, Burnside Hall 1205

Robust intersection of quadric surfaces

by

Dr. Sylvain Lazard
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Visit sponsored by the Inria Équipe Associée Isa-McGill
http://www.loria.fr/~everett/McGill-ISA/McGill-ISA.html

Abstract. We present a new algorithm for computing a parametric representation of the intersection of two arbitrary implicit quadrics with rational coefficients. Our method is similar in spirit to the pencil method introduced by J. Levin (1976) for explicitly describing the intersection of two quadrics, but extends it in several directions. Combining results from the theory of quadratic forms, a projective formalism and new theorems relating the geometry of the intersection to properties of the discriminant of the pencil, we show how to obtain parametric representations that are both "simple" (the size of the coefficients is small) and "as rational as possible" (the size of the field extension in which the coefficients live is optimal in the worst case). Since computing the intersection of two surfaces is an important step in CSG-to-Brep (i.e., Constructive Solid Geometry -to- Boundary Representation) conversion, the output of our algorithm is well suited for the robust boundary evaluation of second-order CSG models.

Organizers: D. Avis(CS), W. Brown(Math), D. Bryant(CS/Math), L. Devroye(CS), K. Fukuda(CS), B. Reed(CS), V. Rosta(Math), G. Toussaint(CS) and S. Whitesides(CS).
Information: http://www.cs.mcgill.ca/~fukuda/semi/discmath.html