Waltzing on a KDF9
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This paper describes steps to use modern technology to describe the centuries old Labanotation for illustrating dance steps. These are animated by figures constructed from ellipsoids using NUDES and graphical editors. The resulting challenges are far from conquered.

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CR Categories: D.3.2 – Specialised application languages, F.2.1 – Computation on polynomials, G.1.2 – Approximation of surfaces and contours, I.3 – Computer Graphics

1. INTRODUCTION
Early in 1973, a Sydney Choreographer, Phillipa Cullen, came to the Basser Department of Computer Science and talking to Professor John Bennett, she asked a question about a dance notation called ‘Labanotation’ (Hutchinson, 1954). She had a book in which were described many interesting dances, but they were listed in Labanotation (Arbeau, 1589) which she did not know. She asked the simple question: Could a computer program be written to take the notation, and produce animated images of a synthetic figure doing the dance, for then she could copy the movements of the figure and so learn the dance? She was brought to see me, as I was at least trying to draw human figures by computer.

Books on Labanotation and other dance notations were hard to comprehend so I started ballet lessons and later took sabbatical leave to study Labanotation with Rhonda Ryman, Drid Williams, and Ronne Arnold.

2. NUDES
The human body being curved, it is natural to try to draw it using curved primitives. The simplest of these are the quadrics. Thus the Numerical Utility Displaying Ellipsoid Solids (NUDES for short) was born (Herbison-Evans, 1979). As John Bennett pointed out, ellipsoids have the great advantage of only requiring the solution of a quartic equation to find where two ellipsoids intersect and where hidden lines start and end. Quartic equations can in principle be solved by fast analytic algorithms, rather than the slow iterative algorithms required for solving general polynomials.