962-65-120 **Yves Nievergelt** (Yves.Nievergelt@mail.ewu.edu), Department of Mathematics, Eastern Washington University, 216 Kingston Hall, Cheney, WA 99004-2418. *Hyperspheres and Hyperplanes Fitted Seamlessly by Algebraic Constrained Total Least-Squares.* Preliminary report.

For each finite set of points in a Euclidean space of any dimension, the algorithm presented here determines all the algebraically best fitting circles or lines, spheres or planes, or hyperspheres or hyperplanes, in a seamless manner from spherical through affine manifolds. In particular, affine submanifolds of any dimensions are *not* singularities of the algorithm. To this end, the algorithm combines projective geometry, Coope's and Gander, Golub, and Strebel's layouts of the equations, and Golub, Hoffman, and Stewart's generalization of the Schmidt-Mirsky matrix approximation theorem to solve the equations. The resulting best fitting manifolds remain invariant under rigid transformations. Moreover, if the best fitting manifold is affine, then it coincides with Golub and Van Loan's affine manifold of Total Least-Squares. Thus the algorithm can also fit hyperspheres in a manner that remains robust with data lying near a hyperplane.

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