1035-53-1172 **Mario Micheli*** (mariom@dam.brown.edu), Division of Applied Mathematics, Box F, Brown University, Providence, RI 02912. *The Geometry of Landmark-based Shape Manifolds.*

In recent years the use of differential-geometric techniques for the study of shape deformation has rapidly spread to broad applied fields such as Pattern Analysis (e.g. in Medical Imaging) and Statistical Methods. One of the main ideas in this area has been to use fluid flow notions, which lead to a Riemannian metric on many deformation related spaces. However, the geometry of these Riemannian manifolds has remained a mystery until very recently: we have addressed the problem of computing the curvature of the shape space of landmarks. The research is in progress, but a clear picture of the geometry of such space is surfacing. Knowledge of curvature on a Riemannian manifold is essential in that it allows to infer about the existence of conjugate points, the well-posedness of the problem of computing the implicit mean and higher statistical moments of samples on the manifold, and more. All this is crucial in applications such as Medical Imaging, where statistical analysis is normally performed on the tangent space at the implicit mean. Such differential-geometric issues are too often ignored in the applied fields, which can lead to conspicuous inaccuracies. We address these problems, both from a purely mathematical point of view and with the help of numerical implementation. (Received September 18, 2007)