1145-49-1650   **Nicolas Charon***, Clark Hall, office 317B, 3400 N. Charles Street, Baltimore, MD 21218, and **Hsi-Wei Hsieh** (`c76068@gmail.com`), AMS Department, Johns Hopkins University, 3400 N Charles Street, Baltimore, MD 21218. *Diffeomorphic registration of discrete varifolds.* Preliminary report.

We propose a new framework and algorithm pipeline to address the problem of diffeomorphic registration of a large class of geometric objects that can be described as discrete distributions of local direction vectors called varifolds. It builds, on the one hand, on the large deformation diffeomorphic metric mapping (LDDMM) model to generate deformation groups and metrics on those groups as well as the idea of representing shapes as oriented varifolds. However, unlike previous approaches in which varifold representations are primarily used as surrogates to define and evaluate fidelity terms, the specificity of this work is to directly express the dynamical system corresponding to deformations of discrete varifolds . We then show that the registration problem can be formulated as a finite-dimensional optimal control problem which we numerically solve through a geodesic shooting strategy. In addition, we introduce and analyze a projection-based approach in order to reduce the size of varifold representations and accelerate the registration pipeline. (Received September 23, 2018)