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**Jonathan R. Bates\*** ([jbates@math.fsu.edu](mailto:jbates@math.fsu.edu)), FSU Mathematics, 208 Love Building, 1017 Academic Way, Tallahassee, FL 32306-4510. *Use of the heat kernel to establish natural maps between anatomical surface models.*

We study anatomical variation using surface models (compact, closed surfaces in Euclidean space). A difficult problem in computational anatomy is the unsupervised construction of a diffeomorphism between two surfaces that matches points in a biologically meaningful way. One approach has been to use the heat kernel associated with each surface to derive correspondences between points, thought of as a stochastic affinity between them. We discuss a family of mappings from a surface into Euclidean space related to the heat kernel and an interpretation of Euclidean distance between points in the images. Understanding the relationship between these mappings, the heat kernel, and geodesic distance is important if we are to make guarantees regarding the use of these tools in computational anatomy for constructing a “natural” diffeomorphism between surfaces. (Received September 25, 2012)