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**Monica K Hurdal\*** ([mhurdal@math.fsu.edu](mailto:mhurdal@math.fsu.edu)), Florida State University, Department of Mathematics, Tallahassee, FL 32306-4510. *Modeling the Shape and Structure of the Human Brain.*

The human brain is a very complex organ, with the functional processing occurring on the highly folded surface, called the gray matter. Neuroscientists are interested in comparing the shape of the cortex across various populations, such as those with neurodegenerative diseases, cognitive disorders or different population ages. Researchers need to develop 2D, surface-based analysis methods for analyzing the location of functional processing and studying disease and aging. Our group was the first group to propose using conformal-based methods for unfolding and flattening the cortical surface. We compute our quasi-conformal maps using circle packings and since our method, a number of other conformal-based approaches have been suggested. I will discuss the method of circle packings, how we are applying it to brain imaging and where quantifying cortical shape using geometric and conformal invariants is leading to promising new avenues of research. (Received September 20, 2006)