Title: Harmonic Mapping of Intracranial Aneurysm Surfaces

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Abstract:
This work describes an approach for harmonic surface mapping of intracranial aneurysms into a topologically equivalent canonical space. We use this approach to map and visualize local hemodynamic variables associated with the surface of sidewall internal carotid artery aneurysms (ICA) imaged by 3D X-ray angiography. These variables are derived from steady-state and dynamic computational fluid simulations. An invertible harmonic map from the aneurysm surface onto the unit disc allows visual inspection of the entire surface and associated variables at once, unobscured by shape irregularities. Results indicate that the resulting maps are close to being conformal, thereby preserving local shape. This approach has applications in the generation of statistical atlases of aneurysms and in quantitative group studies of aneurysm development, growth, rupture, and treatment.

Short bio:
Ashraf Mohamed is a research scientist with Siemens Corporate Research, Inc (SCR) in Princeton, U.S.A., home to one of the world's largest medical imaging research laboratories. He currently manages research collaboration projects between Siemens, physicians at the Texas Medical Center in Houston, Texas, and Computer Science faculty at the University of Houston. After completing his PhD in Computer Science from the Johns Hopkins University in 2005, Dr. Mohamed worked as a postdoctoral researcher at the Department of Radiology at the University of Pennsylvania. Dr. Mohamed also holds Masters degrees in Computer Science and Biomedical Engineering from the Johns Hopkins University and the University of Cairo, respectively. Dr. Mohamed has been with SCR since January 2006. His research interests include neurovascular and abdominal interventional imaging, deformable medical image registration and segmentation, biomechanical simulation, shape modeling and analysis with applications to computational anatomy and clinical neuroradiology.