1046-92-253 **Zijie Liao** (zliao@wpi.edu), Mathematical Sciences Department, Worcester Polytechnic Institute, 100 Institute Road, Stratton Hall 108, worcester, MA 01609, **Xueying Huang*** (xueying@wpi.edu), Mathematical Sciences Department, Worcester Polytechnic Institute, 100 Institute Road, Stratton Hall 108, worcester, MA 01609, **Chun Yang** (yangchun@bnu.edu), School of Mathematical Sciences, Beijing Normal University, Beijing, 100875, Peoples Rep of China, and **Dalin Tang** (dtang@wpi.edu), Mathematical Sciences Department, Worcester Polytechnic Institute, 100 Institute Road, Stratton Hall 108, worcester, MA 01609. *3D In Vivo MRI-Based FSI Models for Human Carotid Atherosclerotic Plaques and Patient-Specific Plaque Progression Growth Functions with Validation.*

Mechanisms governing atherosclerotic plaque rupture and progression are not well understood. The purpose of this research is to identify mechanical factors which may contribute to plaque progression and quantify patient-specific plaque growth functions by using 2D and 3D multi-component plaque models with fluid-structure interactions (FSI) based on serial MRI data taken from patients at multiple time points. 2D and 3D numerical models were constructed to obtain flow and stress/strain data. Four 3D plaque growth functions were obtained using flow shear stress and structure stress from Time 1 and 2. Those growth functions were used to predict plaque progression at Time 3. Predicted plaque progression was compared with actual MRI data at Time 3 for validation. Our results indicated that 3D FSI model gave better predictions for plaque progression than either 3D wall-only/fluid-only or 2D solid models. Large-scale long-term patient studies are needed to further validate our findings. Acknowledgement: This research was supported in part by NSF grant DMS-0540684 and NIH grant R01 EB004759. MRI data was provided by Dr. Chun Yuan and his group from University of Washington Medical School. (Received August 23, 2008)