1046-65-352 **Peng Ni*** (davisni@wpi.edu), 49 Institute Road, Apt 2, Worcester, MA 01609, and **Homer Walker** (walker@wpi.edu), **Chun Yang** (yangchun@bnu.edu.cn) and **Dalin Tang** (dtang@wpi.edu). *GMRES Algorithm in the Meshless Generalized Finite Difference Method for Human Carotid Atherosclerotic Plaque Progression Simulation.* Preliminary report.

Atherosclerotic plaque rupture and progression have been the focus of intensive investigations in recent years. Plaque rupture is closely related to most severe cardiovascular syndromes such as heart attack and stroke. A computational procedure based on meshless generalized finite difference (MGFD) method and serial magnetic resonance imaging (MRI) data was introduced to quantify patient-specific carotid atherosclerotic plaque growth functions and simulate plaque progression.

In this talk, we compare the MGFD method with the currently prevailing finite element method in ADINA. Also, we focus on the linear system embedded in the MGFD method, and introduce the Generalized Minimal Residual (GMRES) algorithm to solve it.

The results from MGFD and ADINA had good agreement (error $< 2\%$). The GMRES algorithm saved 53% CPU time compared to the Gaussian Elimination method for the case simulated. The saving will be critical for 3D models which need several hours/days to solve. The improved MGFD method will be used in further plaque progression simulations.

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