1046-62-1519 **JINFENG WEI*** (jwei@maryville.edu), 650 Maryville University Dr., St. Louis, MO 63141, and **T.C. SUN**. *Rainflow Cycles Counting Method to Assess Time Series Models for Terrain Profiles.*

For non-linear, non-Gaussian, and non-stationary Perryman3 terrain profile, we propose three non-linear models ARMA-GARCH model, TAR model, and EMD model.

We use Rychlik's rainflow cycle counting method to count the oscillation amplitudes and cycles for the three simulation profiles and the original profile respectively and compare them. The roughness of the terrain topography will greatly affect the parts's life and the dynamics system of a vehicle. The oscillation will cause parts deformation and fatigue damage. The life of parts to failure is determined by oscillation amplitudes and cycles.

We found that the simulation of the ARMA-GARCH model has fewer cycles with smaller amplitudes than that of the original profile. The rainflow cycles of TAR model simulation has the same phenomena as that of the ARMA-GARCH Model. But TAR model simulation has more cycles with bigger amplitudes than that of the original profile. So the TAR model can describe the bump part very well. The histogram of the rainflow cycles of the EMD model simulation has a similar pattern with that of the original profile. So the rainflow cycles of the EMD model matches that of the original profile best. So the EMD model is the best choice for the Perryman3 profile data. (Received September 15, 2008)