

**A COMPARISON OF 2 METHODS
FOR FEM SIMULATIONS OF DISCRETIZED
POLYCRYSTALS**

By

Devin Pyle

A Project Submitted to the Graduate
Faculty of Rensselaer Polytechnic Institute

in Partial Fulfillment of the
Requirements for the Degree of

MASTER OF SCIENCE

Major Subject: MANE

Approved:

Antoinette Maniatty, Project Adviser

Rensselaer Polytechnic Institute
Troy, New York

October 2009
(For Graduation December 2009)

ABSTRACT

This work takes a look at two different methods of finite element simulations of discretized polycrystals. The driver of the first method, implemented in a FEM-LIB environment developed at Cornell University, is an in-house code. The second method developed, uses a modification of a common ABAQUS crystal plasticity UMAT. This paper provides verification between the results of the two different methods for different size polycrystals and different loading types. Several different experiments are provided to show reliability between the results, a mesh convergence study, and a basic algorithm efficiency comparison.