Software Lab Project #11
Development of the failure criteria for composites

# Group Meeting #7

**Date:** Tuesday 05-11-2019. (8:00 to 9:30 AM)
**Location:** Chair of Computational Mechanics (Room: N2620)
**In attendance:** Ani Khaloian, Michael Richter (Project supervisors)
Ammar Khallouf, Gavallas Panagiotis, Yasuyuki Shimizu (Group members)

## 1. Discussion on feedback regarding current code status:

-The group members discussed in detail with the supervisors, the current development situation of the material subroutines, they also answered the supervisor's technical queries regarding the code implementation and acknowledged the received feedback.

- Mr. Khallouf, responded to the supervisor's remarks on the material subroutines code received on 04.11.2019. He clarified the theory and logic behind the adopted procedures in the code. The supervisors in response suggested improving the material input interface in the subroutine to make it clearer for the user, in addition to better description for the state variables.

-Ms. Ani, asked Mr. Khallouf to provide the literature used in developing the continuum damage mechanics model of Hashin-Rotem criteria for further study and verification.

-Mr. Shimizu received technical feedback from the supervisors regarding the Hoffman and Maximum strain criteria. He discussed with the supervisors the code compiling errors and convergence problems encountered during the execution of the code in ABAQUS. The supervisors suggested to review the code syntax thoroughly to eliminate such issues.

-Mr. Panagiotis received technical feedback from the supervisors regarding the Puck criteria. The supervisors had a query about the application of damage to the material matrix and the literature used for deriving the failure criteria equations, in response Mr. Panagiotis said that he fixed an earlier problem of damage application where it was only applied to certain elements of the material matrix and he stated that he will send the links for obtaining Puck failure equations.

-The supervisors emphasized the need for a more efficient exchange procedure of work in progress including subroutine codes and FE models, as it is more organized and simplify the process of reviewing the work done by group members. The group members in return will create a (Syncshare) folder including work in progress to provide easy access for the supervisors

## 2. Discussing further steps:

-The group members using PowerPoint slides presented the progress made on the project. Mr. Khallouf, illustrated the refinement and improvements made to the code set including restructuring the code in a more concise and generic style, fixing old bugs, including gradual damage model, adding Hoffman and Maximum Strain criteria, creating standalone copies of the code for testing of results.

-Mr. Richter, highlighted the potential of a gradual damage model similar to yielding plasticity models, he recommended to have at the end of the project a single code program which combine all the failure criteria and damage models and allow the user to make selection between them.

-Mr. Khallouf shared with the supervisors, the proposed table of contents for the project documentation and the distribution of work between group members.

- Mr. Shimizu and Mr. Panagiotis, discussed briefly with the supervisors their code and FE model results.

## 3. Next Meeting:

-The next meeting with the supervisors will be held on Friday, November 22$^{nd}$ at 1.15 PM (Room N2620).