Last Updated: March 26, 2019 at 2:34pm

Name:

# Homework 5

**Due 8 April 2019**

1. Consider a uni-directional short-fiber composite with $E_f = 200$ GPa, $\nu_f = 0.2$ and $E_m = 10$ GPa, $\nu_m = 0.4$. Assume fibers and matrix are both individually isotropic, and that the fiber aspect ratio is 50.

   (a) Use Eshelby's model to compute the stiffness for a very small volume fraction, $V_f = 0.1\%$

   (b) For the same volume fraction (and using the same mesh) compute the stiffness using Homogeneous Traction, Homogeneous Displacement, and Periodic boundary conditions in finite elements.

   (c) Compare with Eshelby's model and modify your mesh (and RVE) until the stiffness converges to the Eshelby solution. How do the various boundary conditions compare in their convergence?

   (d) Compute the stiffness for a larger volume fraction, $V_f = 50\%$. How does this compare with your Mori-Tanaka results from Homework 2?