

1086-74-1084 **Hyunsun Lee*** (hlee@hpu.edu). *Research on estimating the overall behavior of heterogeneous composites based on Hashin-Shtrikman variational principle and its applications.*

To find the overall mechanical properties of heterogeneous particulate composites like rocket propellant, granular media, the well-known Hashin-Shtrikman-Willis variational principle is used. This theoretical framework is directly applied to numerically generated or real materials. The emphases are placed on anisotropic material responses of the tomographically characterized packs with different order of statistics used in the mathematical models and on an highly efficient numerical integration of highly complex functions such as the high-order probability functions and the second derivative of Green's function in the calculation. Selected examples are presented to illustrate both the numerical and physical facets of the work. A few interesting future applications associated with Liquid Crystal Elastomers (LCE) are presented. (Received September 18, 2012)