1014-74-1407 **Michael Stuebner*** (stuebner@math.lsu.edu), Department of Mathematics, Louisiana State University, Baton Rouge, LA 70803-4918, and **Robert Lipton**. *Optimization of composite structures subject to local stress constraints.*

An extension of current methodologies is introduced for optimization of graded microstructure subject to local stress criteria. The method is based on new multiscale stress criteria given by macrostress modulation functions. The modulation functions quantify the intensity of local stress fluctuations at the scale of the microstructure due to the imposed macroscopic stress. The methodology is illustrated for long cylindrical shafts reinforced with stiff cylindrical elastic fibers with generators parallel to the shaft. Examples are presented for shaft cross sections that possess reentrant corners typically seen in lap joints and junctions of struts. It is shown that the computational methodology delivers graded fiber microgeometries that provide overall structural rigidity while at the same time tempering the influence of stress concentrations near reentrant corners. (Received September 28, 2005)