1023-51-559   **Andrej Cherkaev*** (`cherk@math.utah.edu`), Department of mathematics, JWB, 155 S 1400 E, University of Utah, Salt Lake City, UT 84112. *New exact bounds for effective properties of multicomponent conducting composites and Localized polyconvexity.* Preliminary report.

The Hashin-Shtrikman bounds and their generalizations (Lurie & Cherkaev, Tartar & Murat) restrict the effective tensor of any composite independently of its microstructure; they depend on the conductivities of the components and their fractions only. The bounds are exact for two-component mixtures but not for the multicomponent ones. The paper suggests new exact bounds for multicomponent two- and three-dimensional conducting composites. The system of inequalities for an effective conductivity tensor consists of the Hashin-Shtrikman bound and novel compliments to it. The derivation of the bounds is based on the developed concept of "localized polyconvex envelope": We take into account the fact that quasiconvex envelope of the Lagrangian coincides with the Lagrangian itself outside of a set of instability. The related inequalities are used to constrain the supports of minimizers and obtain the bounds. To prove the exactness of the obtained new bounds, we demonstrate the finite-rank laminate structures that realize them. These geometrically sophisticated structures are built using the regular procedure developed recently by N.Albin, V.Nesi and the author. (Received September 18, 2006)