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**Robert Lipton\*** ([lipton@math.lsu.edu](mailto:lipton@math.lsu.edu)), Department of Mathematics, 384 Lockett Hall, LSU, Baton Rouge, LA 70803. *Homogenization and field concentrations in heterogeneous media.*

A multi-scale characterization of the field concentrations inside composite and polycrystalline media is developed. The talk focuses on gradient fields associated with solutions of second order elliptic PDE with measurable coefficients. A rigorous mathematical theory for assessing the  $L^p$  integrability of gradient fields inside microstructured media is developed. The results are described in terms of the  $p^{th}$  order moments of the solution of two-scale corrector problems. Examples are provided that illustrate the theory and its application. (Received August 13, 2006)