

TEMPLE UNIVERSITY

Department of Mathematics

Analysis Seminar

Room 617 Wachman Hall

Monday, April 4, 2016, 2:40 p.m.

*Nonreflexive representations of Jordan multialgebras
in the theory of exact relations for effective tensors
of composite materials with an application to
Calculus of Variations.*

by Yury Grabovsky

Temple University

Abstract: Many important questions about the effective behavior of composite materials can be restated as problems in Calculus of Variations, where the unknown is a vector field. One such question is whether every composite can be mimicked by a laminate made with the same constituent materials. The parallel question in the context of Calculus of Variations is whether every rank-one convex function, (i.e. convex along rank-one lines) is quasiconvex. Both questions have been open for a long time, and both have been answered in the negative in general. However, the examples settling these questions are unwieldy and hard to construct. In this talk I will produce an aesthetically beautiful example of a rotationally-invariant rank-one convex, non-quasiconvex function. This example comes from the theory of exact relations, where sets of all possible equations satisfied by effective tensors of all laminates are parametrized by special representations of Jordan multialgebras. If the representation is reflexive, then the corresponding equations hold for all composites, and not just for laminates. All terminology will be explained in the talk.