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Part I: Combinatorializing Vector Bundles Part II: Topologizing Combinatorial Bundles

Abstract for the Combinatorics and Number Theory and Geometry/Topology Seminars 2003 May 5 and 6

Matroid bundles are combinatorial objects which mimic real vector bundles. Gelfand and MacPherson used oriented matroids in bundle theory to get a combinatorial formula for the rational Pontryagin classes. MacPherson abstracted this into a bundle theory called ``matroid bundles. In the first talk I will show how to construct a map from the set of isomorphism classes of rank-k vector bundles over a regular cell complex B to the set of isomorphism classes of rank-k matroid bundles over B. In the second talk I will discuss the Spherical Quasifibration Theorem, which associates a spherical quasifibration to a matroid bundle, and the Comparison Theorem, which shows that the composition of these two associations is the forgetful map given by deleting the zero section. I will also give some important consequences of these results in characteristic classes. These talks are based on the paper of L. Anderson and J. Davis, ``Mod 2 cohomology of Combinatorial Grassmannians, Selecta Mathematica, New Series, 8 (2002).