Friedrich HEGENBARTH

New results in 4-dimensional topology

Abstract. Controlled surgery theory can be successfully applied in 4-dimensional topology. An interesting question is whether a nonsingular bilinear form can be realized as the intersection form of a closed 4-manifold M. If the fundamental group is non-trivial it is extremely difficult to answer this question. For trivial fundamental groups M.Freedman classified 4-manifolds in terms of their intersection forms. We give an answer in case of free fudamental groups using controlled methods recently developed by E.Pedersen, F.Quinn, A.Ranicki and M.Ymasaki. This leads also to the construction of new closed 4-manifolds. There will be given an exposition of the technique and an outline of proofs of our new results.