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The use of controlled surgery in dimension four

Abstract. The fundamental group of a 4-manifold is the main obstacle to construct framed embedded 2-spheres on which surgeries can be performed. If it is a “good” group surgery theory works as in higher dimensions. Controlled topology serves to overcome the embedding problem. The basic issue is Freedman’s disc embedding theorem for which Quinn has given a controlled improvement. Besides the controlled setting there is an important property of the control map (it has to satisfy UV-1) to construct 2-sphere embeddings. As in the classical surgery there are controlled L-groups fitting in the exact surgery sequence. The talk will give more details and explain difficulties in the specific case of freely generated fundamental groups.