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On the Homotopy Classification of 2-Complexes

Given a group G and an integer m , how can one find all 2-complexes K (up to homotopy) with fundamental group G and Euler characteristic m ? Wesley Browning's work from the late 1970's answered this question in case G is finite (with some exceptions). He showed for example that on the minimal possible Euler characteristic level there can only be finitely many distinct homotopy types, and one can count them. On each level above the minimal one there is a unique homotopy type. Very little is known in case G is infinite. Results obtained by Dunwoody in the early 1980's show that the situation is radically different from the finite case. Even in very concrete settings, for example when G is the Klein bottle group, homotopy classification is a mystery. My talk will be a brief survey of the status of the homotopy classification problem for 2-complexes.