SEMINARIO

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Generalized orbifold Euler characteristics and their properties

Abstract: Orbifold Euler characteristic was introduced by physisists in 1985 (L.Dixon, J.A.Harvey, C.Vafa, E.Witten: Strings on orbifolds) for global quotients, that is for pairs (X,G) consisting of a topological space X (a manifold in their considerations) and an action of a finite group G on it. It can be defined by two equivalent equations

$$\chi^{\mathrm{orb}}(X,G) = \frac{1}{|G|} \sum_{\substack{(g_0,g_1)\in G^2: \\ g_0 g_1 = g_1 g_0}} \chi(X^{\langle g_0, g_1 \rangle}) = \sum_{[g]\in \mathrm{Conj}\, G} \chi(X^{\langle g \rangle}/C_G(g)),$$

The fact that this invariant was called {\em orbifold} (and in a paper of F.Hirzebruch, H.H\"{o}fer even the Euler number of an orbifoid), means, of course, that the authors understood that it was an invariant not only of G-spaces, but of orbifolds. However, a formal definition for orbifolds themselves was first given in 1996 (Sh.Sh.Roan.). (The fact that for an orbifold being a full quotient X/G, this definition gives $\chi^{\mathrm{orb}}(X,G)$ required a separate proof.) Among some properties of the orbifold Euler characteristic one has an analogue of the Macdonald equation: an equation for the generating series of the (usual) Euler characteristics of the symmetric products of a topological space. One has generalizations of the notion of the orbifold Euler characteristic corresponding to (arbitrary) finitely generated groups. (For these groups being free abelian they were essentially defined in a paper of M.Atiyah and G.Segal, 1989.)

We shall discuss how one property of these invariants (the so called induction property introduced in a paper by S.M.Gusein-Zade, I.Luengo, and A.Melle-Hern\'andez) permits to reduce proofs of (some) other their properties to verification on one point sets (with the (only) action of an (arbitrary) finite group). Such verifications lead to purely algebraic problems.

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