Eighth International Conference on
Geometry, Integrability and Quantization
June 9–14, 2006, Varna, Bulgaria
Ivaïlo M. Mladenov and Manuel de León, Editors
SOFTEX, Sofia 2007, pp 135–143

FINITE GROUP ACTIONS IN SEIBERG–WITTEN THEORY

YONG SEUNG CHO

Department of Mathematics, Ewha Women's University
Seoul 120-750, Republic of Korea

Abstract. Let X be a closed and oriented Riemannian four-manifold with $b_2^+(X) > 1$. We discuss the Seiberg–Witten invariants of X and finite group actions on spin^c structures of X. We introduce and comment some of our results on the subject.

1. Introduction

In the past twenty years, the symbiosis between mathematics and theoretical physics has always been a source of unexpected and profound results.

Even if we do not make attempt to relate it chronologically, the story begun with the Donaldson's gauge theory aiming a nonabelian generalization of the classical electromagnetic theory.

As results of it the nonsmoothability of certain topological four-manifolds, exotic smooth structures on $\mathbb{R}^4$, and nondecomposability of some four-manifolds have been established.

The computation of Donaldson invariants however is highly nontrivial.

In 1994, the monopole theory in four-manifolds gave a rise to the Seiberg–Witten invariant which is much simpler than the Donaldson theory, also had almost the same effects on the Donaldson theory, and was used for a proof of the Thom conjecture.

At almost the same time the Gromov–Witten invariant of symplectic manifolds was introduced. Using it we may compute the number of algebraic curves, representing a two-dimensional homology class in a symplectic manifold.

In 1995 Taubes [26] proved that for symplectic four-manifolds the Seiberg–Witten invariant and the Gromov–Witten invariant are the same.

In 1982 Freedman [15] classified the simply connected closed topological four-manifolds.