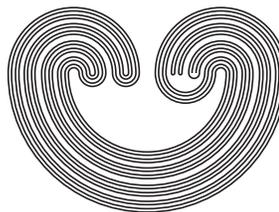


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## CIRCLE GROUP ACTION ON THE PRODUCT OF TWO PROJECTIVE SPACES

by

JASPREET KAUR, HEMANT KUMAR SINGH, AND TEJ BAHADUR SINGH

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## CIRCLE GROUP ACTION ON THE PRODUCT OF TWO PROJECTIVE SPACES

JASPREET KAUR, HEMANT KUMAR SINGH, AND TEJ BAHADUR SINGH

**ABSTRACT.** Let  $G = \mathbb{S}^1$  act freely on a finitistic space  $X$  with mod 2 cohomology ring isomorphic to the product of two projective spaces. In this paper, we determine the possible cohomology algebra of the orbit space  $X/G$  when  $G$  acts freely on the product of two real projective spaces. We also show that the group  $G$  cannot act freely on the product of two complex projective spaces.

### 1. INTRODUCTION

Let  $G$  be a topological group acting continuously on a topological space  $X$ . An intricate problem associated with the transformation group  $(G, X)$  is to determine the topological or the homotopy type of the orbit space  $X/G$ . The first such question was raised by H. Hopf in 1925-26, for the orbit spaces of free actions of finite cyclic groups on spheres. Because of the complexity in resolving such problems P. A. Smith [7] introduced the study of homological relationships among the space  $X$ , the fixed point set  $X^G$ , and the orbit space  $X/G$  of a periodic homeomorphism on  $X$ . Since then, several authors have contributed to such problems. For instance, Ronald M. Dotzel et al. [3] determined the cohomology algebra of the orbit spaces of free circle group action on finitistic spaces having mod  $\mathbb{Q}$  cohomology algebra of the product of two spheres. More recently, in [5] the possible mod  $p$  cohomology algebra of the orbit space of any free circle group action on a finitistic space having mod  $p$  cohomology algebra of a lens space or  $\mathbb{S}^1 \times \mathbb{C}P^m$  has been investigated. Continuing this thread of research, in this paper we study free  $G = \mathbb{S}^1$  action on a finitistic space

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