http://topology.auburn.edu/tp/

TOPOLOGY PROCEEDINGS

Volume 54, 2019

Pages 103–108

http://topology.nipissingu.ca/tp/

Lusternik–Schnirelmann Category of the Configuration Space of Complex Projective Space

by

Cesar A. Ipanaque Zapata

Electronically published on November 16, 2018

Topology Proceedings

Web:	http://topology.auburn.edu/tp/
Mail:	Topology Proceedings Department of Mathematics & Statistics Auburn University, Alabama 36849, USA
E-mail:	topolog@auburn.edu
ISSN:	(Online) 2331-1290, (Print) 0146-4124

http://topology.auburn.edu/tp/
http://topology.nipissingu.ca/tp/

TOPOLOGY PROCEEDINGS
Volume 54 (2019)
Pages 103-108

E-Published on November 16, 2018

LUSTERNIK–SCHNIRELMANN CATEGORY OF THE CONFIGURATION SPACE OF COMPLEX PROJECTIVE SPACE

CESAR A. IPANAQUE ZAPATA

Abstract. The Lusternik–Schnirelmann category $cat(X)$ is a homotopy invariant which is a numerical bound on the number of critical points of a smooth function on a manifold. Another similar invariant is the topological complexity $TC(X)$ (a la Farber) which has interesting applications in robotics, specifically, in the robot motion planning problem. In this paper we calculate the Lusternik–Schnirelmann category and, as a consequence, we calculate the topological complexity of the two-point ordered configuration space of $\mathbb{CP}^n$ for every $n \geq 1$.

1. Introduction

The *ordered configuration space* of k distinct points of a topological space X (see [4]) is the subset

$$F(X,k) = \{(x_1, \ldots, x_k) \in X^k \mid \ x_i \neq x_j \text{ for all } i \neq j\}$$

topologized as a subspace of the Cartesian power X^k. This space has been used in robotics to try to avoid collisions when one controls multiple objects simultaneously [6].

The first definition of category, given by L. Lusternik and L. Schnirelmann [9], was a consequence of an investigation to obtain numerical

2010 *Mathematics Subject Classification.* Primary 55R80, 55M30; Secondary 55T10.

Key words and phrases. complex projective space, configuration space, Lusternik–Schnirelmann category, topological complexity.

The author wishes to acknowledge support for this research from FAPESP 2016/18714-8.