

MATHEMATISCHES FORSCHUNGSINSTITUT OBERWOLFACH

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Mini-Workshop: **Topological Complexity and Related Topics**

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ABSTRACT. Topological complexity is a numerical homotopy invariant of topological spaces, of Lusternik-Schnirelmann type, introduced by Farber and motivated by the motion planning problem from topological robotics. This mini-workshop assembled researchers interested in calculating the topological complexity and its many variants, with the aim of providing a snapshot of the current state of knowledge, and shaping directions of future research.

Mathematics Subject Classification (2010): 55-XX, 68T40.

Introduction by the Organisers

The mini-workshop *Topological Complexity and Related Topics* was attended by 16 participants from 9 different countries. The list of participants was designed to be ‘vertically integrated’, in the sense that every career stage was represented, from PhD students to professors. The morning speakers presented surveys on some particular aspect or variant of topological complexity, while the afternoon speakers gave shorter and more specialized talks on their current research. The schedule also included ample time for discussion and collaboration.

Topological complexity is a numerical homotopy invariant of topological spaces, closely related to the Lusternik-Schnirelmann category. It was introduced by Michael Farber in the early 2000s as part of his topological study of the motion planning problem from robotics, and has become a very active area of research in applied topology. The computation of topological complexity and its many variants presents several challenging topological problems, each of which may have

practical consequences for the design of efficient motion planning algorithms. By now there are several variants of topological complexity (including higher, symmetric, equivariant and rational versions) as well as applications of the ideas to related problems (such as immersions and embeddings of manifolds, or the topological complexity of kinematic maps). These themes were all discussed at the mini-workshop, which concluded with an informal problem session.

The proceedings of the mini-workshop will hopefully be published as an issue of the AMS Contemporary Mathematics series.

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Mini-Workshop: Topological Complexity and Related Topics**Table of Contents**

Jesús González	
<i>Topological complexity, immersions, and embeddings of real projective spaces</i>	707
Aleksandra Franc (joint with Neža Mramor)	
<i>Algorithmic approach to topological complexity</i>	709
Andres Angel (joint with Hellen Colman)	
<i>Survey of equivariant notions of topological complexity</i>	711
Marek Kaluba (joint with Zbigniew Błaszczyk)	
<i>On Equivariant Topological Complexity of \mathbb{Z}/p-spheres</i>	713
Zbigniew Błaszczyk (joint with Marek Kaluba)	
<i>Yet another approach to topological complexity of robots with symmetric configuration spaces</i>	716
J.G. Carrasquel-Vera	
<i>Survey talk on rational topological complexity</i>	717
Marzieh Bayeh (joint with Soumen Sarkar)	
<i>Topological Complexity and Invariant Topological Complexity</i>	719
Petar Pavešić	
<i>Remarks on the topological complexity of a map</i>	721
Bárbara Gutiérrez (joint with Jesús González, Hugo Mas and Sergey Yuzvinsky)	
<i>Higher TC of some polyhedral product spaces and its asymptotic behavior in random models</i>	723
Jesús González (joint with Mark Grant and Lucile Vandembroucq)	
<i>Topological complexity and Hopf invariants</i>	727
Daniel C. Cohen	
<i>Topological complexity of configuration spaces and related objects, I</i>	730
Daniel C. Cohen	
<i>Topological complexity of configuration spaces and related objects, II</i> ...	733
Nathan Fieldsteel	
<i>Topological Complexity of Non-Generic Arrangement Complements</i>	736