EUROPEAN SCIENCE FOUNDATION

Short Visit Grant ☒ **or Exchange Visit Grant** ☐

(please tick the relevant box)

Scientific Report

Scientific report (one single document in WORD or PDF file) should be submitted online <u>within one month of the event</u>. It should not exceed eight A4 pages.

<u>Proposal Title</u>: Topological Complexity and related invariants

<u>Application Reference N°</u>: 5777

1) Purpose of the visit

The purpose of this visit was to work with M. Farber on the notion on Topological Complexity and, more generally, on the notion of Sectional Category. These invariants can be difficult to determine and it is important to develop methods which can be useful to compute them.

2) Description of the work carried out during the visit

A powerful method for the computation of Topological Complexity, which is based on the notion of topological complexity/sectional category weight of cohomology classes, has been developed by M. Farber and M. Grant in the articles "Symmetric motion planning" and "Robot motion planning, weights of cohomology classes, and cohomology operations". Since cohomology classes can be considered as special cases of homotopy classes of maps, we have discussed a possible extension of the theory of topological complexity/sectional category weight to homotopy classes of maps. We hope that this approach will give a new useful tool for the determination of the topological complexity/sectional category.

During this visit, I also gave a seminar entitled "Rational topological complexity and Poincaré duality complexes".

3)   Description of the main results obtained

We have determined a formalism which is convenient to extend the notion of topological complexity/sectional category weight to homotopy classes of maps. In particular our formalism gives a generalization of the concept of weight of cohomology classes when cohomology is considered with local coefficients. We also discussed some elements towards the development of this theory.

4)   Future collaboration with host institution (if applicable)

We aim to continue the development of the theory described in 3) and to find interesting examples of application.

5)   Projected publications / articles resulting or to result from the grant *(ESF must be acknowledged in publications resulting from the grantee's work in relation with the grant)*

When the programme indicated in 4) will be achieved, an article containing our results will be prepared.

6)   Other comments (if any)