Compact Lie Group Actions on Smooth Manifolds

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Lecture 1

The lecture will last 90 minutes. The following topics will be discussed during the lecture.

1. Haar integral and orthogonal representations of compact Lie groups.

2. Cells and handles with group actions, and vector bundles over orbits.

3. Vector bundles over contractible CW complexes in the equivariant setting.

4. Smooth manifolds as CW complexes with vector bundles in the equivariant setting.

5. The Mostow–Palais embedding theorem.

Problem session

The session will last for 90 minutes.The participants will solve problems related to Lecture 1, as well as those needed for Lecture 2. Problems will be distributed among participants before the course.

Lecture 2

The lecture will last 90 minutes. The following topics will be discussed during the lecture.

1. The Smith Theory for group actions on contractible CW complexes.

2. Construction of contractible CW complexes with group actions.

3. Equivariant K-Theory and extension of vector bundles with group actions.

4. Thickening of CW complexes to smooth manifolds in the equivariant setting.

5. The converse to the Smith Theory for group actions on contractible manifolds.

Prerequisities

For Lecture 1, we assume basic knowledge of topology (in particular, homotopy theory), group theory, and linear algebra. For Lecture 2, in addition to the topics above, we assume familiarity with parts of homology and cohomology theory, as well as knowlegde of standard facts from differential topology. Lecture 1 has an elementary character, while Lecture 2 focuses at more advanced audience.