Cohomological equations for locally Hamiltonian flows

Minsung Kim

Abstract: The cohomological equation is a functional equation that appears in various aspects of dynamical systems. Cohomological equations for area-preserving flows were solved by G. Forni, and they were applied to prove the deviation of ergodic integrals for the flow. In this talk, we study the cohomological equation for smooth locally Hamiltonian flows on a minimal component of compact surfaces. I will introduce new obstructions to solving the equations (so-called invariant distributions) that did not appear in the previous settings.

Our main theorem states that the regularity of the solution depends not only on the vanishing of Forni's invariant distributions. It also depends on vanishing a family of new invariant distributions, reflecting the behavior around the singularities (saddles). Our result provides a complete solution to the regularity problem for almost all locally Hamiltonian flows. This is joint work with Krzysztof Frączek.