

Approximately holomorphic methods in symplectic topology

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ABSTRACT

The first part of the course will provide a short introduction to symplectic topology, providing the main definitions and classical results. I will in particular show that symplectic geometry is, in some sense, a natural generalization of Kähler geometry. The course will then focus on the approximately holomorphic techniques first introduced by Donaldson in the mid-90's. These methods, which make it possible to show that many remarkable properties of complex manifolds remain valid in the symplectic world, lead to interesting new topological invariants of symplectic manifolds. Focusing mostly on the four-dimensional case, I will show how one can construct maps from arbitrary compact symplectic manifolds to projective spaces, and in particular to $\mathbb{C}\mathbb{P}^2$. I will then introduce monodromy invariants and discuss their properties, including examples and potential applications.