

Hyperbolicity and shadowing property for linear operators on Banach spaces

Michał Maciaszek

03/06/2022

The definitions of hyperbolicity and shadowing property play a very important role in the theory of dynamical systems. Therefore, the relationship between these two definitions were studied extensively also for linear operators (mainly homeomorphisms) on Banach spaces. For example, it was proved that any linear homeomorphism $L : X \rightarrow X$ on Banach space X that is hyperbolic, has shadowing property. Also, if X is finitely dimensional, then any linear homeomorphism L satisfying shadowing property is hyperbolic. However, there are examples of non-hyperbolic homeomorphisms that satisfy shadowing property. Also recently, there was established a relation between hyperbolicity and expansive homeomorphisms satisfying shadowing property.

In this talk, we present the results based on the paper *Hyperbolicity, Shadowing, and Bounded Orbits* by K. Lee and C. A. Morales. Namely, we establish the result that a linear homeomorphism $L : X \rightarrow X$ on a Banach space X that satisfy shadowing property is hyperbolic if and only if the set of bounded orbits is closed. We obtain that result using bounded shadowing property. In the second part we present some examples when that result may be used and show some open problems regarding this topic.