Pseudo-orbits in linear dynamics

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I will present the concepts of shadowing and chain recurrence for linear operators. It is shown that shadowing and finite shadowing always coincide for operators on Banach spaces, but we exhibit operators on the Fréchet space $H(\mathbb{C})$ of entire functions that have the finite shadowing property but do not have the shadowing property. A characterization of mixing for continuous maps with the finite shadowing property is established in the setting of uniform spaces, which implies that chain recurrence and mixing coincide for operators with the finite shadowing property on any topological vector space. A characterization of dense distributional chaos for operators with the finite shadowing property on Fréchet spaces is also provided. As a consequence, if a Devaney chaotic (resp. a chain recurrent) operator on a Fréchet space (resp. on a Banach space) has the finite shadowing property, then it is densely distributionally chaotic. The results are illustrated in the context of weighted shifts on Fréchet sequence spaces.

References

 NILSON C. BERNARDES JR. AND ALFRED PERIS, On shadowing and chain recurrence in linear dynamics. Adv. Math. 441 (2024), art. n. 109539. https://doi.org/10.1016/j.aim.2024.109539

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