

Recurrent operators

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The notion of recurrence for a dynamical system has a very long history; its origin might be traced back to the Poincaré recurrence theorem. A systematic study in non-linear dynamics was undertaken in the work of Birkhoff, Gottschalk, Hedlund, Furstenberg and others. In linear dynamics, however, recurrent operators have only recently been studied in a fundamental paper by Costakis, Manoussos and Parissis. One interest in the notion of recurrence comes from the fact that it covers both complicated dynamical behaviour (every hypercyclic operator is recurrent) and very regular behaviour (the identity operator is recurrent).

We will discuss the notion of a recurrent linear operator and some of its properties. We will pay particular attention to various examples of recurrent operators that are not hypercyclic. We will also mention generalisations of recurrence like frequent recurrence. If time permits we will finally discuss a curious phenomenon detected by Chan and Seceleanu: if a weighted shift admits a single non-zero limit point (in particular if it is recurrent) then it is hypercyclic.