

## Non-compact dynamical systems

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Let  $\{f f_{i_t}\}$  be a real action on the locally compact separable metric space  $X$ . Let  $\mathcal{V}$  denote the real valued functions on  $X$  which are non-increasing on orbits. The (generalized) recurrent set  $\mathcal{R}$  consists of those  $x \in X$  for which all  $f \in \mathcal{V}$  are constant on the orbit of  $x$ . The set  $\mathcal{R}$  (which contains the non-wandering set) can be characterized intrinsically by means of prolongational limit sets.

We consider those dynamical systems (“gradient flows”) for which the generalized recurrent set  $\mathcal{R}$  is empty. This is an essentially non-compact phenomenon. A subclass consists of the dispersive, or parallelizable systems, and the most general gradient flow is a union of parallelizable ones. Moreover, we show how to synthesize gradient flows from a family of parallelizable flows.