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Hamilton-Jacobi equations and Aubry-Mather theory

Aubry-Mather theory has been developed in the framework of the study of Hamiltonian systems, but it has recently turned out that some of its ideas and tools can be usefully applied in the analysis of Hamilton-Jacobi equations, especially in connection with homogenization problems and issues related to long-time behavior of solutions in the time-dependent case.

Once such a link is established, other wider applications are attainable, for instance in the Lyapunov functions theory and to prove the existence of smooth time functions in orientable Lorentzian manifolds. We will give a general account of the subject and illustrate some examples.