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Sinopsis

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It contains a quick and up to date introduction to viscosity solutions of Hamilton-Jacobi equations for graduate students or young researchers.

Two approaches to large time behavior of periodic solutions of Hamilton-Jacobi Equations are given: PDE and weak KAM theory.

Contributions on hot topics like for example numerical for mean field games should be of interest for many researchers

These Lecture Notes contain the material relative to the courses given at the CIME summer school held in Cetraro, Italy from August 29 to September 3, 2011. The topic was "Hamilton-Jacobi Equations: Approximations, Numerical Analysis and Applications". The courses dealt mostly with the following subjects: first order and second order Hamilton-Jacobi-Bellman equations, properties of viscosity solutions, asymptotic behaviors, mean field games, approximation and numerical methods, idempotent analysis. The content of the courses ranged from an introduction to viscosity solutions to quite advanced topics, at the cutting edge of research in the field. We believe that they opened perspectives on new and delicate issues. These lecture notes contain four contributions by Yves Achdou (Finite Difference Methods for Mean Field Games), Guy Barles (An Introduction to the Theory of Viscosity Solutions for First-order Hamilton-Jacobi Equations and Applications), Hitoshi Ishii (A Short Introduction to Viscosity Solutions and the Large Time Behavior of Solutions of Hamilton-Jacobi Equations) and Grigory Litvinov (Idempotent/Tropical Analysis, the Hamilton-Jacobi and Bellman Equations).

Content Level » Research

Keywords » 49-02, 35F21, 49L25, 35B40, 49N70, 91A13, 14T05, 15A80 - Hamilton Jacobi Bellman equations - Large time behavior - Mean field games - Tropical and idempotent analysis

Related subjects » Applications - Computational Science & Engineering - Dynamical Systems & Differential Equations - Mathematics