

27th IFIP TC7 Conference 2015 on System Modelling and Optimization

Optimal control and Hamilton-Jacobi Bellman equations: Numerical methods and applications

**Convergence of P1 finite element methods to viscosity solutions of degenerate Hamilton-Jacobi-Bellman equations**

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**Abstract:**

The focus of the talk will be on explaining how P1 finite element methods (FEMs) can be adapted to solve isotropic Hamilton-Jacobi-Bellman efficiently.

In particular, it will be discussed how the convergence argument by Barles and Souganidis for finite difference schemes can be extended to FEMs to ensure convergence to viscosity solutions. A key question in this regard is the formulation of the consistency condition.

Due to the Galerkin approach, coercivity properties of the HJB operator may also be satisfied by the numerical scheme. We investigate in a degenerate parabolic setting how one achieves strong (possibly weighted)  $H^1$  convergence of numerical solutions on unstructured meshes.